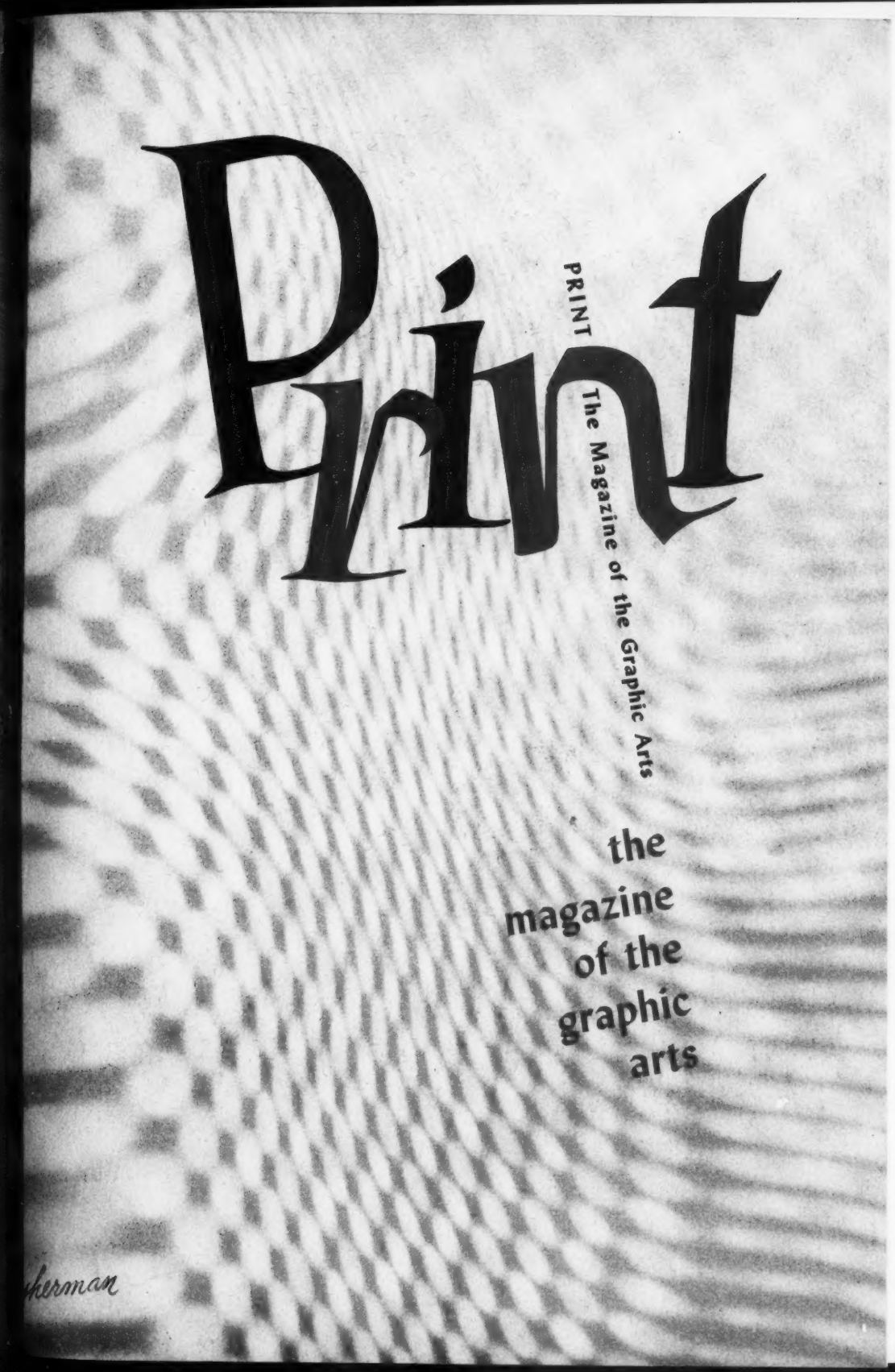
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PRINT
the magazine of the graphic arts

Volume VII November 1952 Number 5

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HOW YOU CAN KILL TWO BIRDS WITH ONE STONE

WELL, all right they are not birds, they are problems that all of us face every year. In my case, there have been forty or fifty such crises. Some of us are older and some younger but there's still the annual crisis "What to give and how much to spend?" Yes, it is Christmas I'm talking about. Let us solve your problems for you this year.

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ANILINE*

Adolescent of the Graphic Arts

by D. E. TUTTLE *and* STEWART HOAGLAND

ALTHOUGH its indicated value of output marks Aniline as one of today's major printing processes, enthusiasts firmly believe that it is still a growing industry which will command an even greater share of the graphic arts market tomorrow. New uses for Aniline printing are announced with such rapidity that it is difficult not to agree with this opinion. Perhaps a period of economic adversity will be necessary before we will have exhausted the mechanical, chemical and sales ingenuity which must be expended on Aniline printing before it assumes a relatively stable place in the graphic arts world.

For the last twenty years Aniline "has had it too good." Until around 1930 it was only an inexpensive reproduction process permitting paper converters to print absorbent stocks with fast-drying inks and complete their converting operations as the paper web came from the press. Aniline is still a dominant factor in this field and, of course, paper conversion is an important part of the growing packaging industry.

Around 1930 cellophane was introduced. Obviously, it was a material for conversion. Because cellophane offers a non-absorbent surface the Aniline process, with its fast-drying inks, seemed to provide possibilities for printing it. The inks (combinations of aniline dyes, shellac and alcohol) which had been used until then lacked the opacity required for cellophane printing and the Aniline printer, who had been making his own inks, called in the ink-makers. They developed pigmented, opaque inks at about the same time that our high standard of living in the United States made well-designed, disposable packaging an important factor in super-market merchandising.

As a result of contributions from many sources Aniline printing had assumed some stature at the outbreak of World War II. During the war, of course, there was practically no press manufacturing, and the status of the industry was frozen except for broadening application techniques. Since the war, press manufacturers have enjoyed substantial backlogs of orders and there has been little compulsion to venture into new avenues of endeavor.

For instance, Aniline is thought of as a rotary, web-fed printing process. There is, however, no particular reason why there should not be sheet-fed Aniline presses. In fact, there is some sheet-fed Aniline printing being done on adapted presses. But the press manufacturers just haven't gotten around to making such presses available.

The principal combination of characteristics which distinguishes Aniline printing from other typographic processes is:

(1) Rubber plates
(2) Fast-drying, fluid inks, and
(3) Printing from the roll, or web-printing (for the present only).

Most of the significant implications from these arise from the characteristics of the inks. The presses cannot use an elaborate system of distribution rollers (nor is it necessary) because the inks would dry before they reached the printing surface.

A "kiss" impression is necessary, not so much because of the nature of the rubber plates which are distorted by pressure, but because of the fluidity of the ink film.

*FLEXOGRAPHIC PROCESS (*see Top Drawer*)

The speed with which the inks dry permits printing on non-absorbent and other "difficult" surfaces with the proper heating system on the press.

While heating equipment is necessary in many instances, the fast-drying inks are presently making possible web speeds of from 100 to 1,000 feet a minute. Rates up to 1,600 feet a minute have been achieved but not maintained because folding equipment is unavailable for such speeds. There is no known limit to the possible web speeds of the Aniline process.

Much Aniline printing today is of high quality, indistinguishable from that produced by other processes. In fact, that is one reason why many persons in the printing industry are unaware of the extent of Aniline printing. They do not recognize it when they see it.

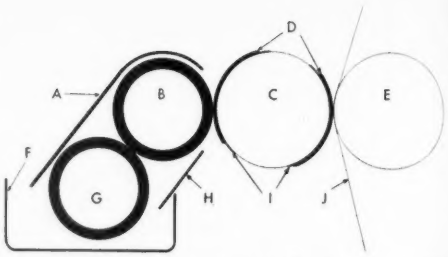
High-quality Aniline printing is a problem in, and tribute to, precision. Any "squeeze" distorts the fluid ink film and the plate. The rubber plates must be of exactly the correct height over their entire area. The rollers run true to within a microscopic tolerance. Good Aniline presses today are heavy enough to run with little or no vibration. The adjusements of form roller to plate, and plate to stock, are precise.

When these conditions exist the Aniline process asks no quarter from any other printing process in the matter of quality except in the printing of fine-screen half-tones.

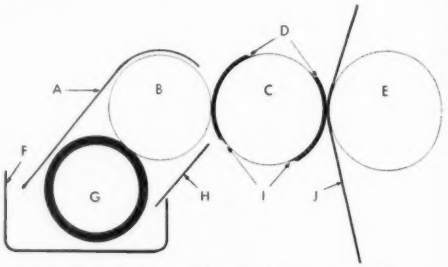
As a matter of passing interest, the process is a quiet one because of fewer rollers, which are usually rubber-covered, and the rubber plates. There are no "vibrating" or reciprocating "ductor" rollers in the distribution system.

A significant contribution to the development of high-quality Aniline printing was the introduction of the Anilox* roller during the late Thirties. The conventional ink distribution system starts with the ink fountain in which the fountain roller—normally a smooth, rubber-covered roll—is immersed. A form roller runs with the fountain roller and, conventionally, this is a smooth rubber roller.

*Trademark of Interchemical Corporation



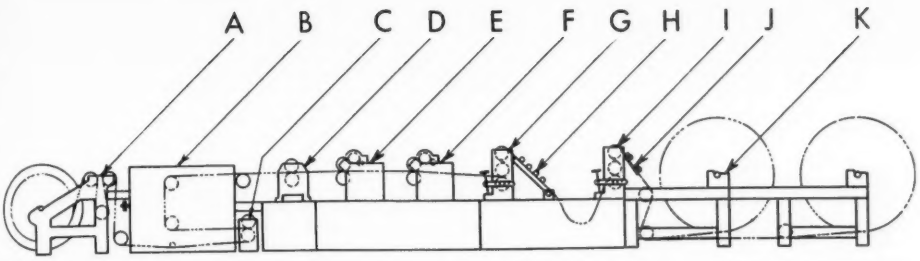
Original Aniline printing unit. (A) Fountain cover. (B) Rubber-covered form roller. (C) Steel plate cylinder. (D) Rubber printing plate. (E) Impression cylinder. (F) Ink Fountain. (G) Rubber-covered fountain roller. (H) Splash guard. (I) "Sticky-back" two-way adhesive. (J) Stock.



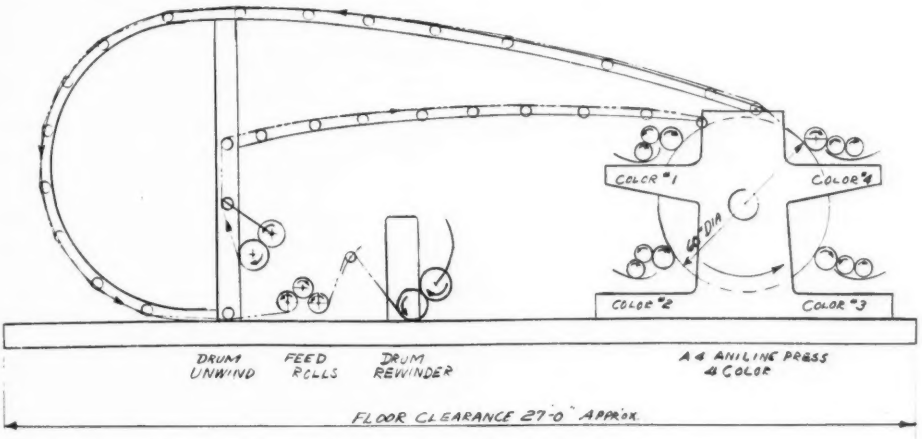
Anilox Printing Unit. (A) Fountain cover. (B) Engraved steel form roller (chromium plated). (C) Steel plate cylinder. (D) Rubber printing plates. (E) Impression cylinder. (G) Rubber-covered fountain roller. (H) Splash guard. (I) "Sticky-back" two-way adhesive. (J) Stock.

With such equipment the ink distribution is determined by the pressure between the fountain roller and the form roller, the viscosity of the ink and the speed of the press. These variables, plus a certain disposition of a rubber roller to bow in the middle, make it difficult to produce a uniform ink film on the printing plate. Furthermore, since the fountain and form rubber rollers are normally made oversize to allow for running at pitch diameter *when squeezed together,* the diameter of the form roller at kiss impression with the plate is usually oversize with the surface speed greater than the plate, resulting in some slip.

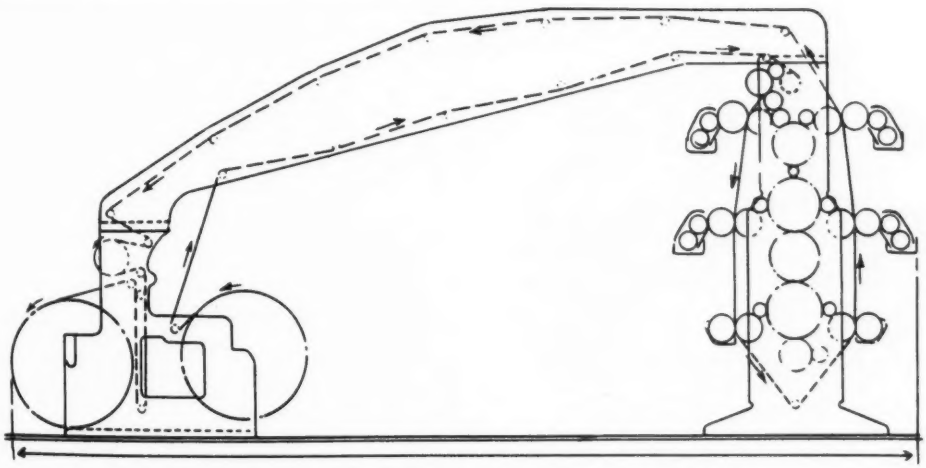
The Anilox roller is a steel roller, with mechanically-engraved cells, which takes the ink from the fountain roller and from which the excess ink is wiped by either a doctor blade or pressure from the form roller. The number of cells and their depth control the amount of ink



Schematic diagram of typical Champlain Aniline-Anilox "straight-line" or "in-line" press. (A) Rewind. (B) Dryer. (C) Pull Unit. (D) Perforator. (E) Aniline unit. (F) Aniline unit. (G) Feed unit. (H) Angular roll stand. (I) Feed unit. (J) Web splicer. (K) Reel carrier.



Schematic diagram of typical Kidder "stack-type" Aniline press.



Schematic diagram of Hudson Sharp arc-type Aniline press, with common impression cylinder.

Letterpress, type on coated paper 13X*

Letterpress, type on newsprint 13X

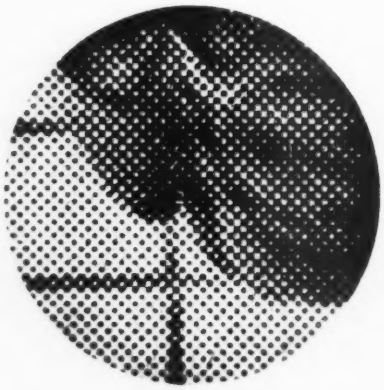
reaching the plate and provide smooth uniform ink coverage, as in rotary gravure printing. The transfer of the ink film from the Anilox roll to the rubber printing plate, and thence to the stock, permits some flow-out of the ink and thus largely eliminates the saw-tooth edge typical of gravure printing.

A complete Aniline press may consist of as few as one or as many as six synchronized printing units. In theory, any number of units is possible but in practice there are physical limits. Some presses group the units about a large, common impression cylinder in the fashion of textile-printing equipment. This type of press is used for obtaining close register in printing the more elastic films which might be easily stretched out of shape.

A horizontal layout of Aniline units is often used for chipboard or similar stocks where bending of the web is undesirable. A vertical arrangement is used for most of the flexible, but dimensionally stable, webs, such as paper, cellophane or cup stock.

Presses arranged on the horizontal plan are called "in-line" or "straight-line" models. The units are one in front of the other and the web

*The photomicrographs were taken at the Interchemical Research Laboratories. The enlargement is indicated by "X". All samples are from commercial production, the idea being to show the printing characteristics of each major process.



Letterpress, halftone on coated paper 13X

Letterpress, halftone on newsprint 13X

Lithography, type 13X

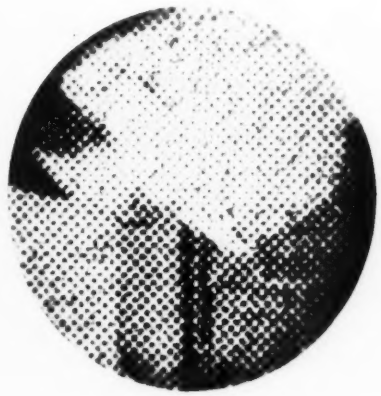
Gravure, type 13X

runs through the press from front to back. The vertically-arranged presses are known as "stack-type" and may have one or two stacks of printing units. Each stack consists of two or three units, one above the other. The web is most often fed from the top and led back over the press to the rewind.

Aniline printing owes much of its flexibility to the fact that many different sizes of plate cylinders may be used on the same printing unit. "Repeat lengths" may range from 5 to 25 inches or more on the same press. Each requires a different-size cylinder, these cylinders being readily interchangeable, usually by hand and with a single wrench, in a few minutes.

Among the latest improvements made available by press manufacturers are variable-speed electronic and mechanical drives for precise and positive repeat control for each unit. This permits a complete range of repeat lengths not limited to the pitch and number of teeth in the usual gear systems. Such drives provide easy plate-register adjustment throughout the full 360 degrees while the press is running.

All Aniline presses are designed for the easy removal and replacement of plate cylinders. This is because cylinders of different diameters are used on the same press and because plates may be mounted and pre-registered on one set of cylinders outside the press while another job



Lithography, halftone 13X

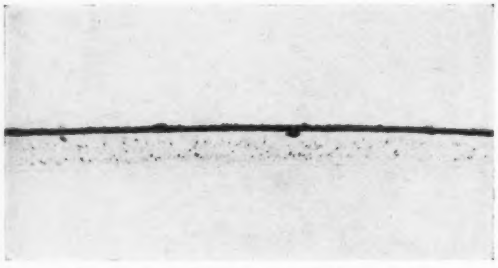
Rotogravure, halftone 13X

is running. This makes possible a high percentage of running time, since press make-ready time is greatly reduced.

In normal Aniline printing units, the entire fountain mechanism is movable to and from the plate. This is done without altering roller or plate adjustments. In most models the plate cylinder and fountain assembly may also be moved as a unit. Some presses permit the movement of impression cylinders to and from the printing cylinder. Each roller and cylinder is independently adjustable, often with provisions for cocking the roll to compensate for plates low on one side or another.

A more-or-less recent development, but fast becoming standard, is a printing unit which automatically backs the plate cylinder away from the impression cylinder and form roller when the press stops, allowing the ink rollers to be continuously rotated. Web tension controls are commonplace.

Despite these many refinements, the cost of Aniline presses is still relatively low compared to units in other processes offering equal advantages.



Cross-section of Aniline, on cellophane 125X

Aniline, on cellophane 12X

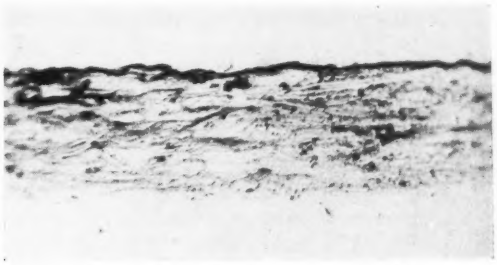
What types of printing are being done by Aniline?

This is a difficult question to answer because no one person is probably familiar with all of them and the complete list available from one or a few persons would be a dull recitation. Aniline is being used for almost every purpose, within the limits prescribed by rotary printing.

Two recent examples are of extreme interest to those associated with the industry. One is the production of books. Pocket Books, Inc., recently issued, among others, "Rand McNally—Pocket World Atlas" in which text and one-color maps were produced by Aniline. This is obtainable from almost any newsstand for a few pennies. It was run on a perfecting press, with 64 pages printed on each side of the web, at a speed of from 600 to 800 feet a minute. The publisher is pleased with the reproduction of detail and the uniform density of the ink film from one part of a form to another, and from one form and signature to another.

The Kraft Foods Company, in its Chicago plant, recently developed a process for printing, by Aniline, filled corrugated cases. After the

Aniline, on paper 12X



Cross-section of Aniline, on paper 125X

cases are filled and sealed they are carried automatically through two printing stations where they are printed on four sides, two sides at a time. The same case has been run through the line ten times, each time printing over the preceding printing, without developing phantom lines. The quality of the printing meets the usual commercial standards. Needless to say, the device has solved an inventory problem arising from having large stocks of printed, unfilled cases in the Kraft Foods warehouse.

In a general way it may be said that the chief application of Aniline printing has been in the packaging field. Also in a general way, it may be said that Aniline dominates the field of short- and medium-run printing in this field just as gravure dominates the long-run portion. There are, of course, many exceptions to these statements.

In addition to expansion in the early field of grocery and specialty bags, Aniline is now used to print, color, coat, trademark or overprint an infinite variety of items. These include counter rolls, wrappers, gummed and pressure sensitive tapes, polyethylene and other plastic films, tubes, egg cartons, laundry boxes, milkbottle caps, corrugated paper as well as items suggested in the previous part of this article.

One of the smallest Aniline presses is a 300-pound cellophane tape printer which handles a web one-inch wide. One of the largest presses weighs 20 tons and prints a web six-feet wide and in up to six colors. Another handles a web 154 inches wide while still another unusual press prints a repeat design 96 inches long.

The flexibility of the process is suggested by a few more unusual applications. One of these is printing an identifying trademark on the waffle-back of Axminster carpeting. The rubber plate must conform to surface variations up to a quarter-inch in depth within an area of less than a half-inch square. The finished print must withstand dry cleaning fluids as well as soaps and detergents.

Another unusual application has been the printing of a multi-colored, registered design on oval-shaped plastic toothbrush containers.

Insofar as it can be said about anything, any analysis of the Aniline printing industry leads to the conviction that, like high taxes, it is here to stay. It is unthinkable that the use of packaging will decline in the United States, and Aniline printing dominates an important portion of the packaging industry.

Interested persons looking at such an industry from the outside commonly wonder where it is going. So do those of us who are associated with it, and perhaps we sometimes miss the forest because of the trees.

Until the present the printing of fine-screen halftones has been a limiting factor in the process, although the printing of screens up to 85 lines has become quite commonplace and finer screens have been printed with creditable results. It seems likely that this barrier will be hurdled on an everyday basis within time.

Growth through the availability of sheet-fed presses has been suggested. It seems certain that it will be only a matter of time before the printer whose work is of a sheet-fed nature will have Aniline presses available to him. Thus a whole new field of activity will be accessible.

Experimental work has been carried on with the Aniline printing of newspapers, with indications that quality would be equal or superior to the present product. There would be less strike-through and smudging than at present. One of the limiting factors on higher newspaper printing speeds has been the heavy plates involved and the terrific centrifugal force developed when news presses are run at high speeds. Flexible Aniline printing plates are, of course, much lighter and the problem of fixing them on cylinders to withstand high speeds would not be a difficult one although, obviously, much experimental work would be required before rubber plates could be produced under conditions prevailing in the newspaper publishing industry.

These are only a few possibilities for the future. And they suggest potentials for growth outside the dynamic packaging industry.

XEROGRAPHY

From the Greek: xeros - dry, *graphos* - writing

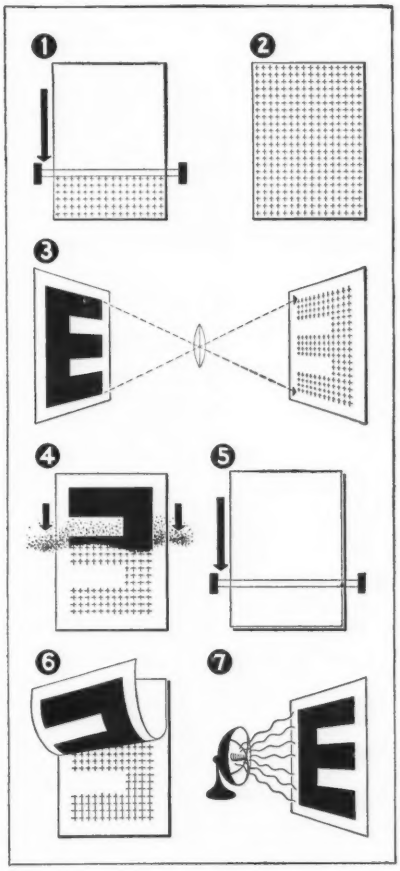
by JOHN B. HARTNETT

IT SEEMS quite probable that the force of inflation and increase in paper work will tend to promote simplification of many industrial processes within the next several years. Among others, the printing trades are saddled with ponderous, expensive equipment, and a large amount of costly hand work. A start in this direction has already been made with the development of typing apparatus known as the "Varityper," the increasing use of quick drying inks, both of the "oil" and "aniline" types, and of electro-mechanical methods of image reproduction—such as xerography. The latter is so designated in contrast to silver halide or blue printing, which are chemical in nature.

The photoconductive plate used in xerography corresponds to the film or paper used in ordinary photography. This plate consists of an electrically conductive backing material, such as metal sheeting or foil, the face of which is coated with a photoconductive insulating material. This coating is a non-conductor of electricity in the dark, but becomes conductive when exposed to light.

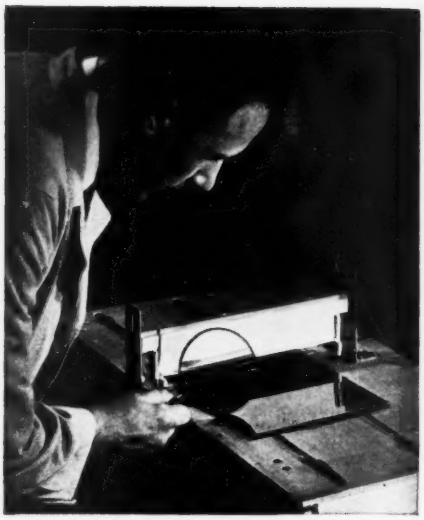
When the coated plate is rubbed with a cloth in the dark, or when it is sprayed with electrons (by a simple electrical device) its surface becomes electrically charged in a few seconds. In the charged condition the plate is sensitive to light.

The sensitized plate is exposed in a camera, through a projection lens, or in a contact printing frame in the same manner that a silver-emulsion film or silver-emulsion paper is exposed to an image pattern. Wherever light strikes the plate, the coating becomes conductive and discharges the electrostatic surface



1. Surface of specially coated plate is being electrically charged as it passes under wires. **2.** Shows coating of plate charged with positive electricity. **3.** Copy (E) is projected through lens in camera. Plus marks show projected image with positive charges. Positive charges disappear in areas exposed to light as shown by white space. **4.** A negatively charged powder adheres to positively charged image. **5.** After powder treatment (Fig. 4) a sheet of paper is placed over plate and receives positive charge. **6.** Positively charged paper attracts powder from plate forming direct positive image. **7.** Xerocopy is heated for a few seconds to fuse powder and form permanent image.

A. The xerographic plate is a thin sheet of metal, coated with a "photoconductive" material. This coating will hold an electrostatic charge in the dark, but releases the charge into the backing metal whenever light strikes it. The plate may be used repeatedly in making pictures or copy reproductions.



B. To make the plate sensitive to image reception, it is passed through a "corona discharge" machine. This device "sprays" electrons on its surface. Fine wires, from which the electrons are emitted, may be seen through the enlarging glass.

charge. On the places where light does not fall, the surface charge remains. Thus the image pattern causes a latent electrical image to remain on the plate. Dry development makes this latent image visible to the eye. The exposure is equivalent in time to that required by fast silver halide projection papers.

Developing is done by flowing specially prepared developing powder over the plate. The powder is attracted to the charged portions of the plate and adheres to those portions tenaciously. The light affected portions of the plate do not retain the powder and it rolls off. The result is a mirror-reversed positive image of the original subject or copy. This corresponds to the developed negative in silver emulsion photography and takes only a few seconds.

The next step is making a permanent print from the developed image. This is done by laying a piece of paper over the powdered plate and charging the paper with the same electronic device used to sensitize the plate. The powder particles relinquish their affinity for the plate and are attracted to the charged paper. By this transfer, the image is restored to its true left-right relationship and is a direct positive reproduction of the original subject. At this stage of the process, the print corresponds to the chemically developed silver-emulsion print before it is fixed in hypo. This step takes 8 to 10 seconds.

Fixing is accomplished by heating the paper print for a few seconds. Heat melts the powder granules and fuses them to the paper. Heating may be done with infra-red lamps, with an electrical oven, or with heated platens. The fusion temperature is no higher than that ordinarily used for drying or ferrotyping silver emulsion prints. The prints are as permanent as the material on which the image is applied.

If the developing powder is black, and the paper upon which the print is made is white, the print will be black and white. Monotone color prints can be made directly by using developing powder that has been dyed the desired color. Multicolor prints can be made by combi-

nation prints, using separate plate images for each color.

Since the material on which the final print is made is merely a surface to receive the powder image, almost any type of paper may be used as printing paper.

With the necessary equipment, the image of an office form, engineering drawing, letter, chart, or any other material can be copied onto an 8½″ x 11″ lithographic master plate by xerography in less than two minutes.

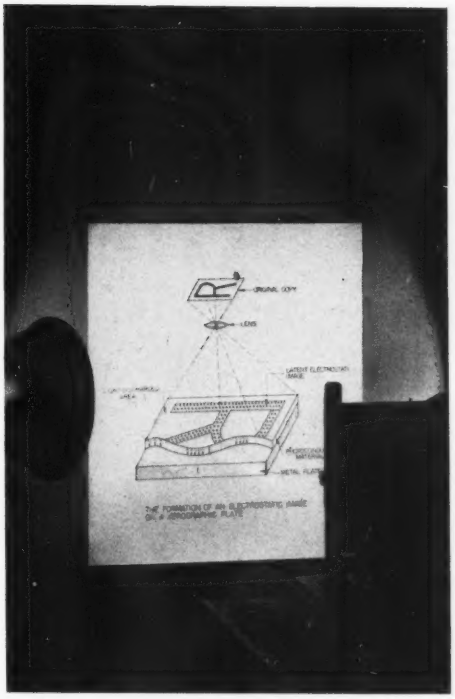
The paper master may then be placed on the cylinder of an offset process duplicator and multiple copies run off. The combined operation from placing of the original copy in the camera to the run off of copies requires less than three minutes, which is said to be faster and cheaper than any other method.

Once the paper master is made, the latent image is removed from the xerographic plate in a few seconds. The same plate can be used hundreds of times before it requires reprocessing.

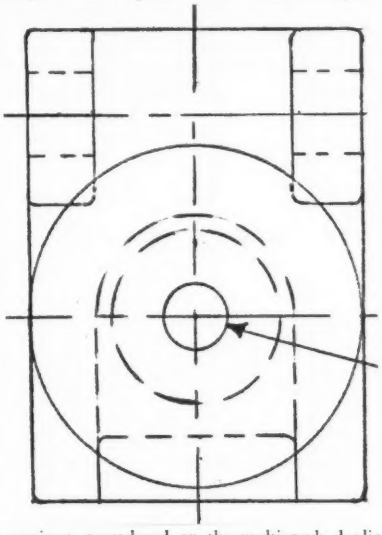
The xerographic process is effecting important savings in critical defense materials as no film, chemicals, sensitized materials or aluminum plates are used. Because of its speed and economical cost, xerography is now in use in a fourth of the first hundred largest business organizations in the United States.

The reproduction equipment consists of three units: camera, copier and fuser. The camera has a fixed focus wide angle lens. This permits copying on to paper masters of subjects with images on both sides of the page. Paper masters are processed in the copier and then the powdered image areas on the surface are made permanent by placing in the fuser for a few seconds. Any office worker can operate the equipment after short instruction.

In addition to this application of xerography, the process is also adaptable to the making of master plates for other forms of the graphic arts—namely, lithography and photoengraving; to the transferring of trademarks or other copy to porcelain, glass, metal, wood and fabrics; to the making of templates for any purpose; to

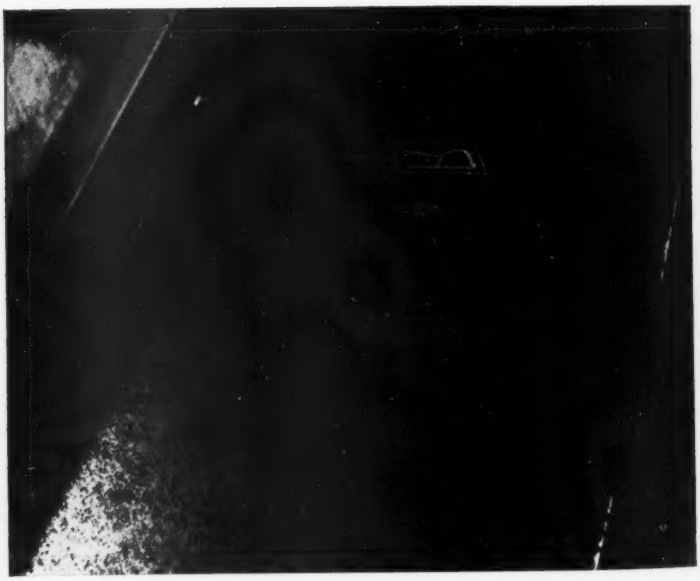


C. The plate is exposed in a camera, under an enlarger, or in a contact printing frame. In this picture the technician is preparing to make a reproduction of a line drawing.

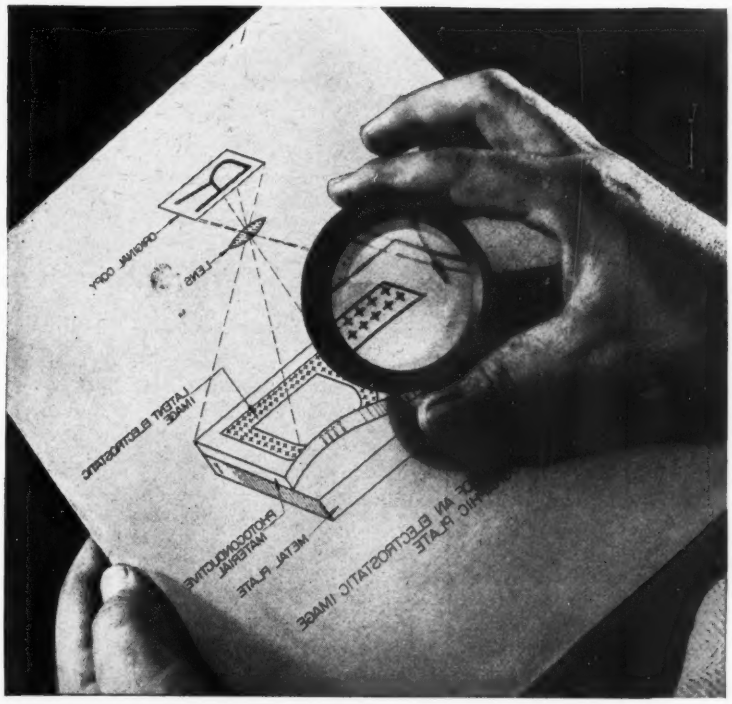


This specimen reproduced on the multigraph duplicator from a paper master produced by xerography.

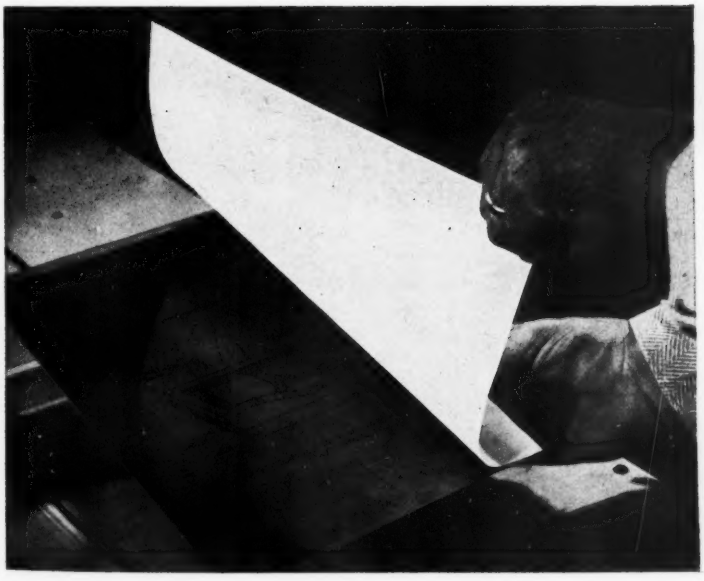
D. Following exposure, the plate is developed by flowing developing powder across its surface in a simple laboratory equipment rocking tray. Oppositely charged particles of developer are released from larger carrier bodies and become attached to the image areas.



E. In this close-up view, the image is becoming visible beneath the cascading developing powder.



F. The developed image is positive, but mirror-reversed. It is comprised of fine particles of developing powder which are held to the plate by electrostatic attraction.



G. After development has been completed, a sheet of paper is place over the plate, and the plate and paper are passed through the corona discharge machine again.

H. The corona discharge mac
electrostatically transfers the
age to the superimposed pa
After it emerges from the
chine, the paper is stripped fr
the plate. The image has b
reversed in the process maki
a direct positive reproduction
the original subject. Now
xerocopy is ready for fixing.

I. Heating the print between platens fuses the developer to the paper and makes the print as permanent as the material on which it is made. After cleaning remnants of the image from the plate (by flowing a cleaning powder over it), it is ready for recharging and reuse.

J. Dry printing is one of the potential uses of xerography. With this experimental machine, a speed of 1200 web-feet per minute has already been achieved. Chief advantages of xeroprinting will be the light weight of printing machinery and simplicity of plate-making. Since the image is transferred from plate to paper electrostatically, no pressures are required. The use of "dry powder" also eliminates drying and offset problems.

direct continuous tone photography, as well as X-rays, spectographs and other scientific uses.

Xeroprinting is a variation of the xerographic process. A plate is made which consists of an image of electrical insulating material on an electrically conductive backing, such as a metal sheet. The plate is fastened to the cylinder of the printing machine and is ready for operation.

When the machine is operating, the image plate passes under a corona discharge device, where an electrostatic charge is imparted evenly to the plate. The charge immediately passes off the conductive or non-printing surfaces, but remains on the insulating or printing surfaces.

As the cylinder turns, the plate enters a developing chamber, in which a powder is cascaded against it. The powder adheres to the parts of the plate which retain the electrostatic charge.

At the next position of the cylinder the developed plate passes under paper which is fed into the machine by standard paper-feed contrivances. Paper and plate pass under corona discharge points, where the image is simultaneously transferred to paper and the plate recharged for the next revolution. The paper bearing its powder image then passes over a rotary heating platen, where the powder image is fixed by heat, or under a spray, where the image is fixed by a solvent.

New Short-Run Color Prints

ONE of the most challenging problems in the full-color reproduction field is the question of securing runs of from 300 to 10,000 color prints economically. The Peacock Color Print is one of the latest solutions. A specimen is inserted facing the title page in this issue.

Peacock is basically a fine screen, three-color letterpress operation using non-metalic printing plates. The actual printing surface consists of minute raised dots formed in a gelatin coating on the special plates. The tops of these dots receive and transfer the ink to the paper, just as in the normal letterpress process. A half-tone screen, usually 150 line, breaks up the image into 22,500 separate half-tone dots per square inch, which aids in holding delicate detail.

The three basic colors of red, blue and yellow are each run separately, and when color correction is needed this is done photographically. The combinations of the three primary colors form a full range of greens, oranges, purples, browns, grays and blacks. The absence of black may be noticeable in some subjects, but if the color separations are carefully done and all steps properly handled, the delicate color balance plus rigid press control will produce a satisfactory black.

The process can start from any flat color artwork, color transparency or direct color separations. Various photographic "masking" techniques are used to refine the color images. In special circumstances, some corrective artwork can be done on the negatives and positives to strengthen or lighten an area. No corrections can be made on the printing plates.

The use of high gloss inks on a rich enameled paper surface imparts a quality of a life-like color photograph at much lower cost and more quickly than other methods.

Limitations of this process must be considered when studying a project: the color area must be square or rectangular; no routing or outlining of subjects is possible. There will be a very slight tone in all the whites. At present the largest plate size is 10" x 13" of color area and can be run on a sheet size 11" x 17". The most popular is the 7¼" x 9¼" color area on 8½" x 11" sheet.

This process is being used successfully for catalog pages, salesmen's portfolio sheets, counter cards, post cards, color inserts, and any other purposes where full-color reproduction in small quantity is desired.

There are times that full-color duplication is required for quantities of 5, 30, or 100 for pretesting contemplated color advertisements, color guides for sign painters, founders' portraits in branch offices, patent office approval of new designs and many other very small quantity problems. In such cases the best current solution is the use of imbibition color prints. The most popular of this method is the Dye Transfer process. This is a three color process, too. The prints are the product of laborious hand operation of laying down in perfect register the three continuous tone matrix films which act as the printing surfaces. Each matrix is immersed in its own color dye bath prior to each time it is used. The dyes are "imbibed" into the paper—thus the name imbibition—and by intermixing of the three primaries provide a wealth of variations to give most all hues. This method provides brilliant reproduction of color transparencies as well as color artwork, etc. in a short time. The necessary color separation work of preparation is the most expensive part of the operation. The duplicate prints will only be a small fraction of the original charge usually accredited to the first print. The paper in all instances is especially prepared heavy photographic stock.

STEEL DRUMS

Color Lithography on 55-gallon Containers

by NICK MAMULA

RHEEM Manufacturing Company, the world's leading maker of steel shipping containers, recently announced the perfection of a process of full-color lithography and inner roller-coating of 55-gallon steel drums. Known as the Rheemcote process, this development provides for fabrication of drums after lithography and roller-coating of flat steel sheets.

Although fabrication after lithographing and lining has been standard practice in the manufacture of small metal containers for many years prior to the new Rheemcote process lithographing, roller-coating, handling and drying equipment never had been designed with sufficient size and weight capacity to handle the 36-pound, 3′ x 6′ sheets of 18 gauge steel of which full-size drums are made. Rheem laid down specifications for a lithograph press capable of meeting requirements of 55-gallon drum stock, and R. Hoe and Company undertook to build the press.

Working closely with Rheem, the Wagner Litho Equipment Company's designers turned out the roller-coating and oven equipment; the feed-in and take-off machinery for this huge assembly was built by the Dexter Folder Company. In the initial development work, Rheem invested more than a million dollars.

Sparked by President R. S. Rheem, and New Orleans Plant Manager L. A. Reber, the Rheem Company envisioned the original idea several years ago. They felt that the steel container market demanded a large drum, precision lined with non-corrosive and sanitary materials to render more satisfactory service than was possible with the sprayed linings to which large drums were then limited. Further, they believed that shippers would welcome large volume containers carrying trade marks and brand names, as well as other copy, with the same detail and authenticity of smaller metal containers. Rubber die printing and silk screening, previously used to decorate large drums, fell short of the accurate reproduction made possible by lithography.

Reber, a veteran in the container industry and a pioneer in metal lithography, was chosen to guide the installation and operation of a pilot line in the New Orleans plant, where steel containers up to 100-pound grease drum sizes had been lithographed for some years. He said, "At one time or another I had operated individually every element of what now is the Rheemcote process, and was confident that, given big enough and precise enough equipment, we could lithograph big drums as easily as a sardine can."

In mid-1949 the press, roller and drying equipment—each unit the largest of its kind ever built—arrived at New Orleans. Newest versions of standard drum fabricating equipment were ordered from regular suppliers. Most of this machinery was modified slightly to permit fabrication with the least possible strain on the inner and outer coating. In addition, many fabricating line components were devised and built by Rheem engineers. Stanley S. Johns, Rheem project engineer, and Dr. L. H. Ott, chief research chemist for the firm, were assigned to New Orleans for the duration of the project's development. Johns' task was to develop such fabricating and handling equipment as was necessary and to integrate the entire operation into a smoothly functioning and

speedy unit. Ott's project was to work with paint, ink and chemical suppliers in determining which coatings, linings and inks would best lend themselves to decoration and coating of drums.

Sheet steel is stored as received in bundles of 160 to 180 sheets, weighing about 6,000 pounds per bundle. Feed equipment at the roller-coater and press picks up each sheet with rubber vacuum cups and starts the process. The coater, press and oven are all geared to a maximum speed of about 4,200 sheets per hour, many times faster than the speed of the fabricating line because a run of sheets may have to make several trips through the press-roller-oven section for each trip through the fabricating part of the operation.

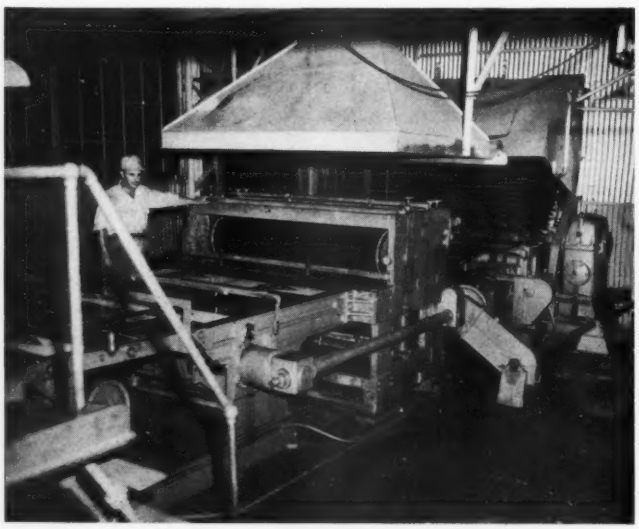
The oven, which accounts for 210 feet of the 300 foot overall press-oven unit, is comprised of three sections: a pre-heat portion heated to from 200 to 275 degrees F.; a baking section in which heat is controlled at from 275 to 450 degrees F. (depending on the composition of the coating to be baked); and a cooling section which reduces the sheet temperature at a controlled rate to eliminate possibility of thermoplastic effect and resultant "blocking" or transfer of coating from one sheet to the next when baked steel is stacked at the discharge end of the oven line. Each sheet in passage through the oven spends six minutes in the pre-heat section, 15 minutes in baking and seven minutes in the cooling portion.

A Dexter sheet inverter at the discharge end of the oven conveyor can be engaged or disengaged at will, to deliver sheets at the end of the oven either coated side up for return to the press or roller-coater, or face down for transfer to the fabrication line.

On completion of baking after the base coat, a run of steel is returned to the press for lithography (if specified). It makes one trip through the press for each color to be lithographed. If the order is for lined drums, another trip through the roller-coater, face down, applies the inner lining.

On completion of the last press or roller operation, sheets are delivered in stacks the size of the original bundles to the Dexter feed table at the start of the fabrication line.

A roller transfer unit moves the sheet into forming rolls, which curl the metal into a loose, open-sided cylinder. Rolls are kept highly polished to protect both outer surface and inner lining of the drum. From the forming unit, the drum shells are propelled through the National



Roller coating machine

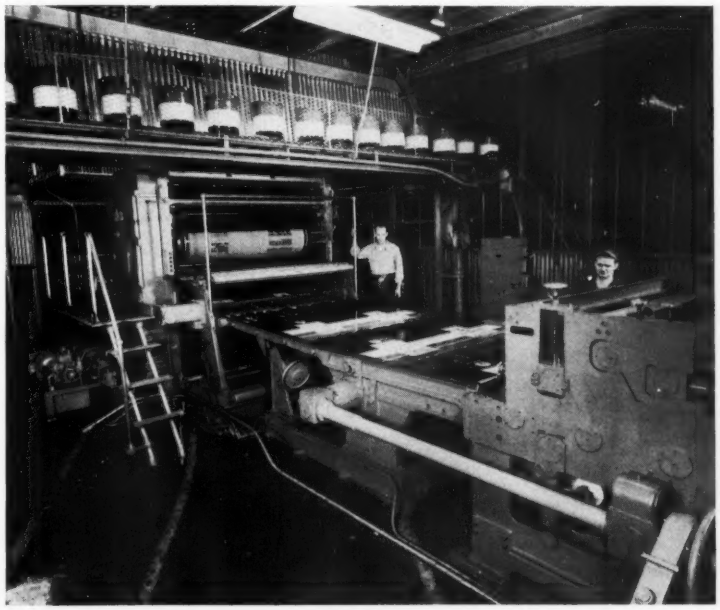
seam welder, where a continuous electric resistance lap-welded seam is formed. Perfection of the Rheemcote process required a welder which would heat only a narrow strip along the seam itself in order to avoid blistering or burning the inner or outer finish. Continuous seam resistance welding proved the ideal answer, as heat is virtually confined to the abraded metal strip at the seam, and temperature does not rise enough outside that one-inch strip to threaten any damage to the finish. A special interior touch-up technique has been developed to apply a uniform coat of lining material to the strip along the inner seam which was cleaned for welding. The process was an important key to successful fabrication of steel drums after inner lining.

Highly polished brass "hour-glass rolls" at the welder hold the drum shell in cylindrical shape as the weld is formed, and the shell is carried away from the welder to a specially designed up-ender.

Next step is flanging, in the twin unit which also swedges in rolling hoops. Heads and bottoms are inserted in the drum as it leaves the swedger. This operation adds a step to conventional drum manufacture, since with lithographed drums and heads, positioning of the head with relation to decoration and copy on the shell, and with relation to the side seam of the drum, is important.

The air test equipment, a development of Stanley Johns, overcomes one of the severest bottlenecks threatening high-speed, automatic drum fabrication. Conventionally one or two men are required to operate an air tester at a maximum speed of about 250 drums per hour. In the Rheem tester, 550 drums can be checked for leakage each hour and the operation is almost fully automatic, requiring only one man.

In the press department, where heads and bottoms for the drums are formed, operation is nearly conventional, except that heads and bottoms are partially pre-curled when blanked and formed, and dies on all press department equipment are kept highly polished. Head sheets are processed in lithography and roller-coating just as the larger body sheets. Two



Metal decorating press

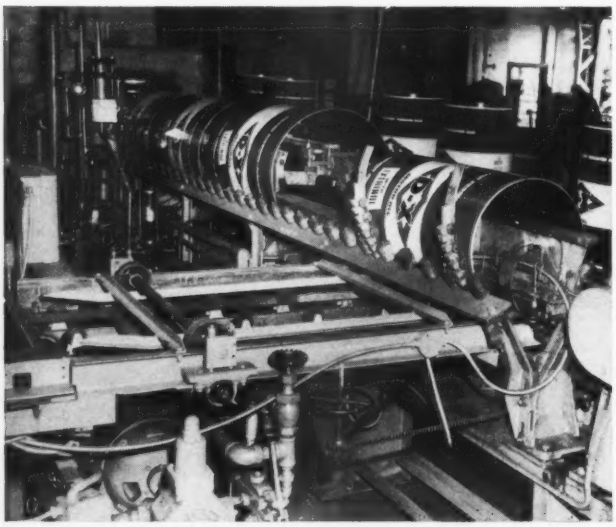
heads are pressed from a single roller-coated and (when specified) lithographed and lined sheet. Bottoms are inner-lined and roller-coated similarly when orders so specify.

Rheemcote application lends itself to the use of oleo resins, vinyls, epons and urea alkyds, and modified phenolics are now undergoing tests to determine whether the modified versions are sufficiently free from the brittleness characterizing most phenolic lining materials to permit drum fabrication after their application. Linings are applied in thicknesses ranging from half a mil to (occasionally) as thick as two mils (.002 inches). Rheemcote linings now in use will contain most solvents and most alkaline materials readily. Most inorganic materials can be contained without difficulty, and an increasing number of organic compounds are joining the list of matter which Rheemcote linings will hold with safety. Main problems in the lining field center on containing highly ionized or oxydizing acids, such as weak phosphoric acid, which poses a problem because of its high degree of ionization. Strong phosphoric—paradoxically, to the layman—is comparatively easy to contain because of its relatively low degree of ionization. However, Rheem chemists are confident that research of the sort now in progress will surmount the few remaining major problems in the field of non-corrosive linings.

Rheem uses both hot rolled and cold rolled steel in drum fabrication, depending on the requirements of each order and the service for which each lot of drums is destined.

While the prime objective of the Rheemcote process was to fabricate 55-gallon drums after color lighography and inner lining, an important accompanying objective was to streamline the whole operation of drum manufacture. Rheemcote methods have accomplished both goals with resounding success. The capacity of production line has been accelerated nearly 100 per cent.

Development of the process has resulted in fabrication of drums which combine new durability and versatility with new merchandising and advertising value; and in production of a superior product at a higher rate of speed without the necessity of substantial personnel increases.



Body forming machine

Modern Silk Screen Printing

by VICTOR STRAUSS

Illustrated by EDITH STRAUSS

SILK SCREEN is used, not only for fine art reproductions, posters, displays, presentations and illustrations, but also to decorate fabric, make wallpaper, print designs on bottles, manufacture toys, games and greeting cards, as well as decalcomanias and industrial dials. It can be employed for printing on almost any surface of any thickness like wood, glass, metal, fabrics, paper or cardboard.

For a demonstration of two uses of silk screen, see the last issue of PRINT, VII:4. The cover design by Andrew Szoeke was reproduced in red and black enamel on Wood Veneer. The frontispiece was printed in nine colors from screens especially made by the artist, André Girard.

It is the purpose of this article to discuss the major features of the process, and primarily so from the production man and art director's point of interest. Technical detail will be mentioned only where it will be necessary for the understanding of the problems involved.

The silk screen "form"

Every printing process needs a form for its execution. Be it type or cuts, etched or lithographic plates such as are used in letterpress, intaglio or offset, there is always a form needed for printing. The silk screen is the form of this process.

Take a wooden frame and stretch stencil silk tightly to its bottom and you have a silk screen. Stencil silk is a gauze similar to other gauzes which are used to sift flour and powders in the process of milling. It is manufactured in various degrees of porosity. The most commonly used stencil silk has approximately 120 pores or meshes to the inch.

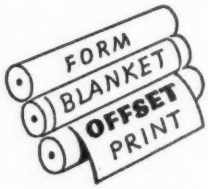
Paint or silk screen ink can be pushed through these pores and will leave an even coating on stock which was placed under the screen. To make the silk screen a form, the pores of the screen must be closed wherever we do not want ink to penetrate; conversely, they must be left open wherever we do want to print.

After the stencil is made, the screen is hinged to a baseboard, the stock is put on this board, the screen is positioned right over the stock, paint is poured in the screen and pushed across the top of the screen with a squeegee, a tool similar to that employed by window cleaners. Once the screen is lifted, a print can be seen on the stock.

In comparing silk screen with other printing processes we can say that it is fundamentally different from letterpress where ink will stick

only to the raised parts of the form; it is different from intaglio where ink is pulled out of the

depth of the form; it is different from offset where ink will stick only to those parts of the form which are treated not to repel it.



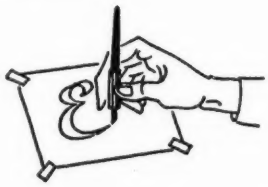
In silk screen the ink is pushed through the pores of the form which is plate and fountain in one.

It is obvious that the layer of ink deposited in this way is much thicker than in any other printing process. It is to this heavy layer of ink that the silk screen process owes its most distinguishing and unique aesthetic feature: its great brilliance and opacity of color, the three-dimensional effect, the hand-painted look.

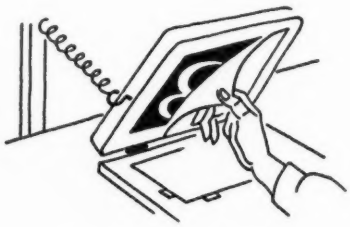
Film cutting

The silk screen process possibly owes its general use more to one invention than to any other cause. I mean the invention of the knife-cut lacquer film by De Autremont. True enough, methods for making screens were known before this invention.

Some of these methods are still in use today. But it was the knife-cut lacquer film more than any other individual achievement that put the process "on the map." This invention is as simple as it is ingenious. A coating of colored yet transparent lacquer is bonded to a piece of transparent backing paper by means of rubber cement. This transparent film can be placed over the copy to be cut.



Film cutting means, in the language of the trade, that the tracer, also known as film-cutter, traces over the copy with his knife all the areas which later on will print. When cutting, he takes care only to pierce the top layer of the lacquer film. After cutting he strips out of the film the areas which will print. Now the stripped film is sealed to the bottom of the silk screen by means of a solvent. Then the backing



paper is pulled away and the result is a screen which is ready for printing after some minor additional preparations are completed.

Unlike its predecessor, the paper stencil, this

stencil does not need bridges. It is possible to get a continuous image with the knife-cut lacquer film since the centers are held in place by the backing paper until they are finally transferred to the screen.

It is hard to believe what wonderful results can be obtained in this way. Very fine detail and even 10-point type can be cut, but it takes great skill and patience to do this type of work.

The reasons why this technique is frequently employed are the following:

All flat and line work can be done this way.

The film is very strong and permits up to 20,000 impressions.

It is possible to work from pencil sketches and to finish art work when cutting film.

The film can be removed by a solvent and the screens reclaimed for future use.

Even though this should be avoided whenever possible, it is feasible to make corrections of a finished screen. Film can be etched out and readhered, provided there is enough space around the parts to be corrected.

Dry brush effects

Screens made out of film are the ideal solution for all flat work. However, since all lines and areas are clearly defined, the result is clean but hard on the eye. The progressive screenprinter was soon faced with the problem of obtaining softer, better-blended effects.

One way to achieve this is by hand painting on the screen. This technique is used mostly to get dry-brush or stipple effects.

The screen maker will paint freely on the screen, using either a stiff brush or a sponge. He will block certain pores of the screen and try to follow the original copy as much as possible.

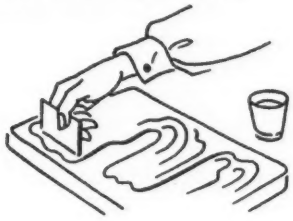
Obviously, much will depend on the skill and experience of the screen maker. Naturally, it is not possible to reproduce art, dot for dot, in this way. However, hand-painted screens have been used in the production, not only of some of the most intriguing posters and displays, but also for fine art reproductions. They give very finely balanced effects, particularly when used in conjunction with many transparencies.

"Tusche method"

This method is used mainly by creative artists who make prints of their own art work or for fine art reproductions. Most of the serigraphs are made this way. Artists who use silk screen for their self-expression wanted to distinguish their silk screen prints from commercial work, so they called them serigraphs.

The tusche method uses lithographic crayons and lithographic tusche in the making of the screen. With these, the artist paints freely on the screen.

After tusching, the screen is coated with glue. Since lithographic crayons and tusche are fatty and water-repellent, the glue will not adhere to the tusched portions of the screen.



After the glue—which has closed all the pores of the screen but the tusched ones—drys, tusche and crayon are etched out with a solvent.

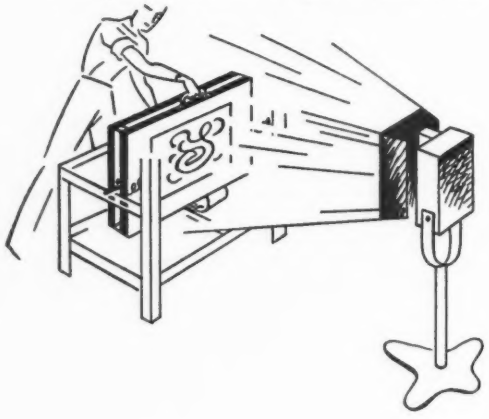
Screens made this way give very beautiful results; but again, it is not possible to produce art dot for dot. This technique is not used very much in commercial work since the screens do not last for long runs.

Photographic stencils

Very fine detail in line work and very small type, as well as halftones, can be produced with photographic stencils. Most of the various methods of making photographic stencils are based on the following chemical principle: a coating of gelatin can be made sensitive to light by adding a solution of compounds of chromic acid. If this sensitized coating of gelatin is exposed to very strong light, the exposed parts become insoluble in warm water; whereas the unexposed parts remain soluble. This principle is the basis of the making of photographic stencils.

The most commonly used films for photographic silk screen stencils are plastic sheets coated with gelatin. The film is sensitized just before use with a solution of bichromate.

After the sheet is dried, a very contrasty engraver's positive is put next to the plastic backing sheet in a vacuum frame. The film is then exposed for 30 seconds to 5 minutes, according to the source of light available. After exposure, the film is developed in warm water and then adhered to the bottom of the silk screen.



After drying, the plastic backing sheet can be stripped off and the result is a photographic silk screen stencil which is used, from there on, just like any other stencil.

The carbon tissue method

This way of making photographic stencils, is used for very fine work. This method, based on the same principle, requires more work and is, therefore, more and more replaced by the method described above. However, there are still many screen makers who consider this method the finest.

Directly sensitized screens

These are also made for certain specific purposes. Here a mixture of gelatin and bichromate is scraped or whirled directly onto the silk screen. The screen is then exposed to light and developed just as any other photographic film. This method is primarily used for the making of textile stencils.

Several shortcuts

It is possible to have reproduction proofs of type pulled either on glassine paper or on clear, plastic sheets. These proofs are very often bronzed for better opacity and used instead of an engraver's positive.

Or an artist can make color separations directly on transparent paper or plastic sheets. For Ben Day effects, some of the various commercially available plastic transparent sheets like Craftint or Zip-A-Tone can be used to good advantage. All these short cuts save time and cost since no engraver's positives have to be made.

The reasons why photographic stencils are not employed nearly as much in general poster and display work as screens made out of knife-cut lacquer film are as follows:

1. Original copy for photographic stencils has to be very well prepared. It is not possible to finish rough art work when making the screen, as in cutting. Original copy has to be photographed and positives have to be made. Since very few shops have enough work of this kind, they do not have cameras, and therefore have to farm out the making of the positives, which means delay and also lack of control.

2. It is not very easy to etch photographic stencils off the silk screen. Very often the silk cannot be reclaimed. This adds to cost.

3. Photographic stencils do not yield as many prints as lacquer film screens.

Copy requirements

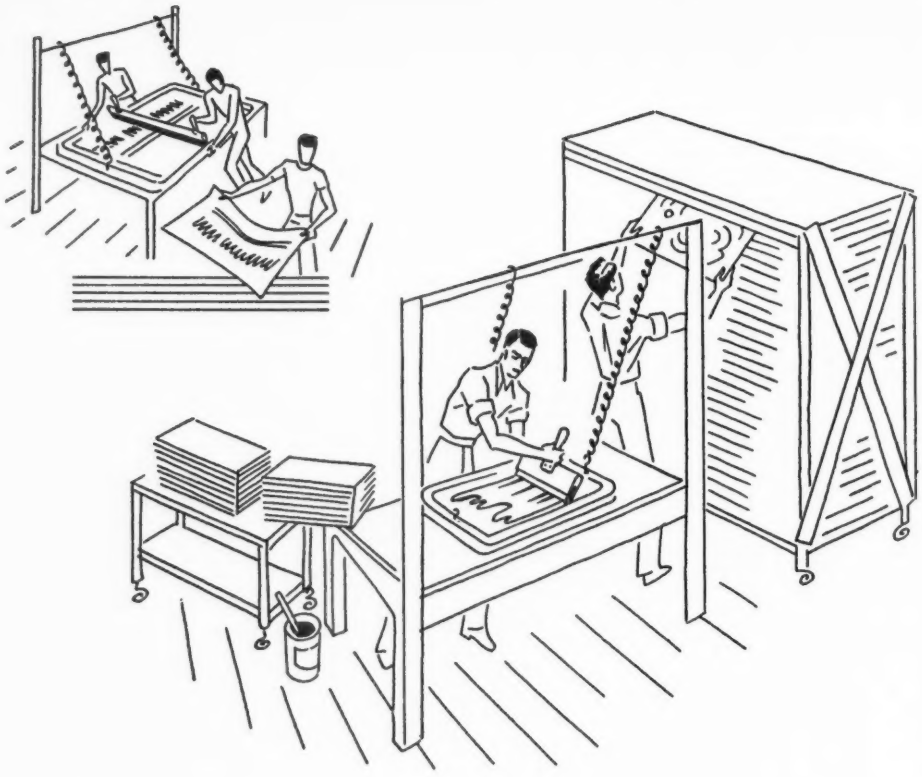
It is important for production men and artists to understand fully the following facts:

To make a photographic stencil, a very hard and contrasty positive is required.

Copy has to have uniform opacity and very sharp outlines. It is therefore not advisable to use copy smaller than the final print for photographic silk screen stencils.

Halftones can be made in silk screen but it is not generally advisable to make halftones finer than 80 lines per inch. Many halftones are made in 65-line screens.

Photographic silk screen stencils cannot be corrected once they are made. They have to be made over completely for the smallest change.



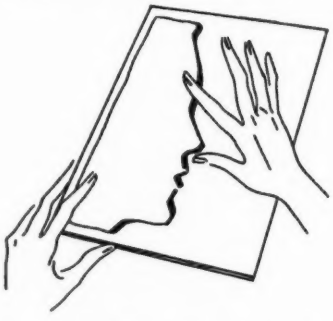
Printing

The customary printing method is as follows: a team of two or three or even four people is employed. The two-man team will consist of a squeegee man who takes the sheet, puts it into guides and pushes the squeegee across the screen; and a take-off man, who removes the processed sheet and puts it into racks.

After about 4 hours on the usual job, the racks are emptied and used again. The bigger the sheet and the bigger the printing area, the more people have to be employed on such a team. Sometimes two squeegee pushers will be needed to get good coverage and sometimes even two people will be needed to take the printed sheet away and put it into racks. Such is the case with, let us say, 44 x 64 sheets with solid coverage.

Drying time

Let us come back again to the basic fact that the layer of paint or ink is so much heavier in silk screen than in any other process.



Here we see a defect of its virtue: the prints cannot be stacked right after processing. They

have to be dried individually. Drying time will vary with the kind of inks employed, which again are determined by the exigencies of the job. In general one can say that, without any forced drying, between 4 and 24 hours will be required before prints can be stacked safely.

Production volume

The production of such a team varies greatly. Compared to any mechanical printing process, it is pitifully low. It varies not only with the size of the sheet, but also with the amount of detail of the screen, with the kind of ink or paint employed and with the nature of the stock.

The following figures are only indicative for very average cases and have to be used with a great deal of discretion.

Assuming an average job of 11 x 14 on either cardboard or cover paper, average production will be a run of 2000 in a 7-hour day. This production can drop to 700 sheets per day, sometimes even less on 44 x 64 sheets.

The printing of enamels or lacquers, for instance, will decrease production considerably. (It is much harder physical work to push a highly viscous enamel than a flat paint.) Some stocks have to be pulled off the screen individually. It has been found that static electricity is sometimes the reason for that.

Similar difficulties can be observed on many plastics and also on foil. Stocks with a lot of structure or tooth will run very slowly, because it is necessary to wipe the screen repeatedly to obtain a good average production.

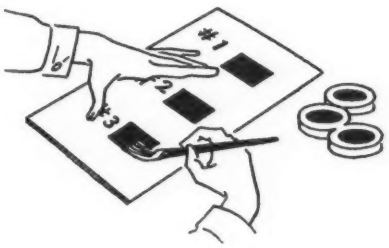
Gang-ups, re-runs

Very often, jobs are printed two, three and more up. As long as the register is not too intricate, almost any number of units can be combined on a sheet. Very delicate register work should not be ganged-up too much.

It is customary to reclaim the screens immediately after completion of the work. Customers should therefore indicate, when placing the order, that the screens should be kept for reruns.

Since the stencils become brittle after several months, the screens suffer and need retouching.

The better screen houses have a sizable number of screens. These represent an important part of their working capital. Consequently, the holding of screens means the blocking of a considerable amount of capital, not to mention the storage problem. That's why the screen trade does not like to hold screens very long for possible reruns.



Color swatches

Since most silk screen work is done in many colors, color matching is of great importance. For all flat poster work, it is best to supply the printer with a set of color swatches for matching. If these color swatches are made by the artist with normal poster colors, it will be possible to match most colors very accurately.

It happens very often that indications for the matching of colors are given in a rather indefinite way. This makes the job of color matching very hard. One cannot talk color.

Color has to be shown!

Instructions like "Make this brown a little lighter" and "that yellow a little more on the greenish side" should be avoided whenever possible.

Let us keep in mind that these instructions are conveyed from the salesman who calls on the customer to the production man who runs the silk screen plant. He in turn has to relay that information to the man in charge of the job and finally to the color matcher. It is obvious that no accuracy can be expected this way.

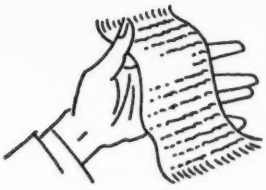
Matching of inks

Sometimes the screen printer is asked to match printing inks, or even dyed fabrics. But tasks like these transgress the scope of the process.

Printing inks vary with the printing process for which they are designed and manufactured, and it is not possible to match colors obtainable in one process just as accurately in another, particularly in silk screen.

The reasons for the above are the following: silk screen inks are made for maximum opacity and flat appearance, and we have already mentioned that the amount of ink deposited is much greater in silk screen than in any other process.

These three factors impose definite limits upon the color values attainable. How much, for instance, gloss changes color can be found out by everybody quite simply by a comparison of a matte print to the same print if it has been varnished.

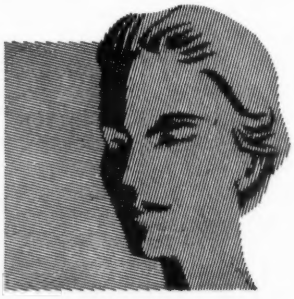


Matching of dyes

Dyed material cannot be matched in any printing process at all. The color matcher can only try to follow the sample as closely as possible, but he can never hope to produce a true match. If an artist working on a fashion job, for instance, wants to get some orientation about the possible color match in silk screen, he should try to match the color of the garment in poster color first. It is very likely that the screen printer will be able to match a swatch made this way.

Transparencies

It often is possible to get additional colors by overprinting transparencies. But since the layer



of ink deposited in silk screen is so much thicker than in any other printing process, it is not possible to get as wide a variety of color with transparencies in silk screen as in other printing processes. The average silk screen job is run in many more colors than is customary in a printing job.

In deciding about transparencies, it is best to use as a rule of thumb the following: in silk screen, one can pick two of three colors when using transparencies. The third one has to be accepted as it comes. For instance,

when trying to get red, yellow and orange by using only two colors, one can pick the red and the yellow and will then have to take the orange resulting.

Proofs

It is possible to prove fine color work in silk screen in full color, these proofs being much more representative of the job than proofs made in other processes. This is one of the main advantages of silk screen color printing. The reason why proofs are absolutely representative of the run is simply this: proofs are made under exactly the same conditions as those of the run.

Blends

One of the ways in which very lovely effects can be achieved in silk screen is by running a blend. Let us assume that we want a background with a soft gradation from dark blue to white.

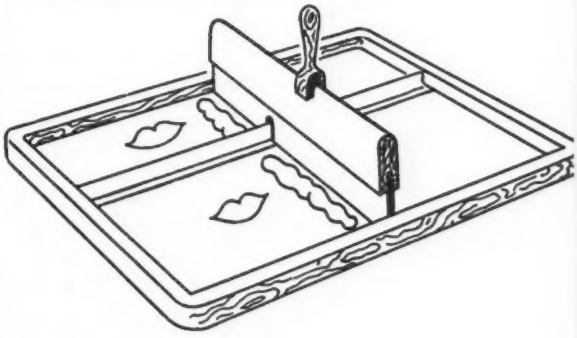
If we run a blend in silk screen, we will put dark blue ink at one end of our squeegee and white ink at the other. Then we mix in the screen, blue and white in various degrees of intensity all along the squeegee. When this paint is pushed across, the result will be a very lovely graded color effect.

Every time we want to pull a print, we have to make sure that the ink is blended about the same way, and whenever new ink has to be added, considerable time is needed to adjust the blend again.

Silk screen blends are very effective, but it takes time and great skill to produce them uniformly. One should therefore always consider the cost of running a blend in two colors equivalent to the cost of three runs.

Split-fountain work

It is possible to make split-fountain runs by running two and sometimes even more different colors in one operation. This is done by fencing off various areas on the screen, and by either using several squeegees or one squeegee, the rubber blade of which is interrupted in conformity with fences on the screen. For split-fountain work one should always have at least a three-inch distance between the various colors.



Enamels and metallic inks

Enamels printed in silk screen are distinguished by their beautiful gloss and raised appearance and are comparable to embossing and thermography. Furthermore, they have excellent wearing qualities. Enamel printing is primarily desired on decorative jobs such as invitations and greeting cards and also on covers of books and presentations.

Sample cards for the cosmetic and paint industries are also silk screen fields.

No process other than silk screen can print such lustrous, beautiful gold and silver.

Metallic prints can also be made in many other colors and give very intriguing effects. For best results, they should be printed over an underlay of silk screen paint.

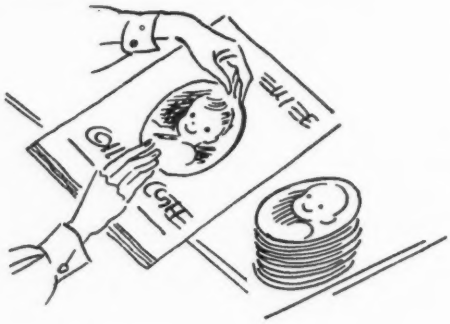
Varnishing

Varnishing can be done either in matte, semi-gloss or high gloss finish. High gloss jobs are comparable to lamination. An important advantage is that stocks of any thickness can be varnished in silk screen. It should be kept in mind, however, that the deposit of varnish is very heavy and that it penetrates the paper and changes the paper's color slightly. For best results, the stock should be covered all over with silk screen paint. Clay-coated stocks do not give best results for varnishing.

Spot varnishing can be done in matte, semi-gloss or high gloss finish, too. It is used frequently to emphasize certain parts of the work.

Spot mounting

Spot mounting, which is sometimes necessary for presentations and displays, is done readily in silk screen. The screen is prepared in the normal way and everything else is done as usual, the only difference being that glue is printed instead of paint. Since the stock is fed into guides, perfect register is secured.



Combination runs

Offset or letterpress printing and silk screen can be combined to obtain very interesting results in a very economical way. It is best to run silk screen last. The heavy layer of silk screen paint makes the feeding of a screen-printed job difficult for high-speed presses. A sheet indicating guide and grippers should always be sent with the job.

Flocking

Silk screen printing is also used in flocking to apply the adhesive onto which cotton or rayon flock is dusted. Velour papers and many other items are made in this way. Flocking is a specialized field in itself.

Four-color process

For years attempts have been made to use silk screen for four-color process work. Obviously, it would be ideal to be able to overcome some of the limitations of silk screen printing this way. However, even though very interesting work has been done in this direction, it is the author's belief that silk screen is not the proper process for this type of work.

The four-color process is based on maximum control of the dot of the halftone and on maximum transparency of the ink. Silk screen is by its very nature highly limited in both respects. Yet four-color process work in silk screen has been done successfully for blowups where a rather coarse effect (comparatively speaking) is acceptable.

This is sometimes the case when blow-ups are made of ads which appeared previously in national magazines.

It is then possible to use black-and-white prints of the color separation engravings and to blow them up and make photographic stencils in this way. But it can be said in general that silk screen offers no particular advantage for four-color process work.

Printing of plastics

Decorating and printing of plastics by silk screen is a very strongly developing field. Plastics are used for displays, presentations, greeting cards, box covers, book jackets, etc. All these can be printed very efficiently by silk screen; sometimes silk screen is the only possible way by which these materials can be printed.

The standard silk screen poster paint cannot be used indiscriminately for that purpose. Since the word plastic covers a wide variety of materials which have quite different physical and chemical characteristics, it is necessary to specify exactly the kind of plastic in question in order to enable the printer to secure the proper type of ink from the ink manufacturer. In other words, each plastic has an ink which is best suited for printing on it.

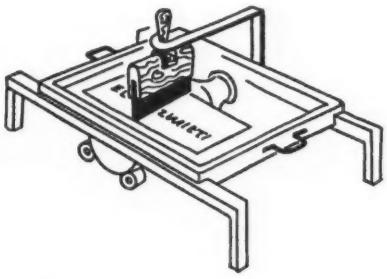
Most plastics have to be printed with lacquers but the same kind of lacquer cannot be used indiscriminately. Cellulose acetate, polystyrene, plastics of the vinyl family, lucite and many other materials are printed upon and each of them requires a different ink. For most of these jobs, photographic screens are made, since it is not possible to use lacquers with screens which are made out of lacquer film.

Since printing with lacquers is rather hazardous, it should be done only by those who are very familiar with the problems and are properly equipped to handle them.

Nonsupported films are mainly printed by the bolt and are widely used for shower curtains and table covers. For this kind of printing, the same equipment as described for the printing of textiles and wallpapers is used. The toy field very often uses nonsupported film which is already cut to smaller sizes before printing. In most cases it is necessary to support these films temporarily, particularly in multicolor and registry work, for best results.

Cylindrical objects

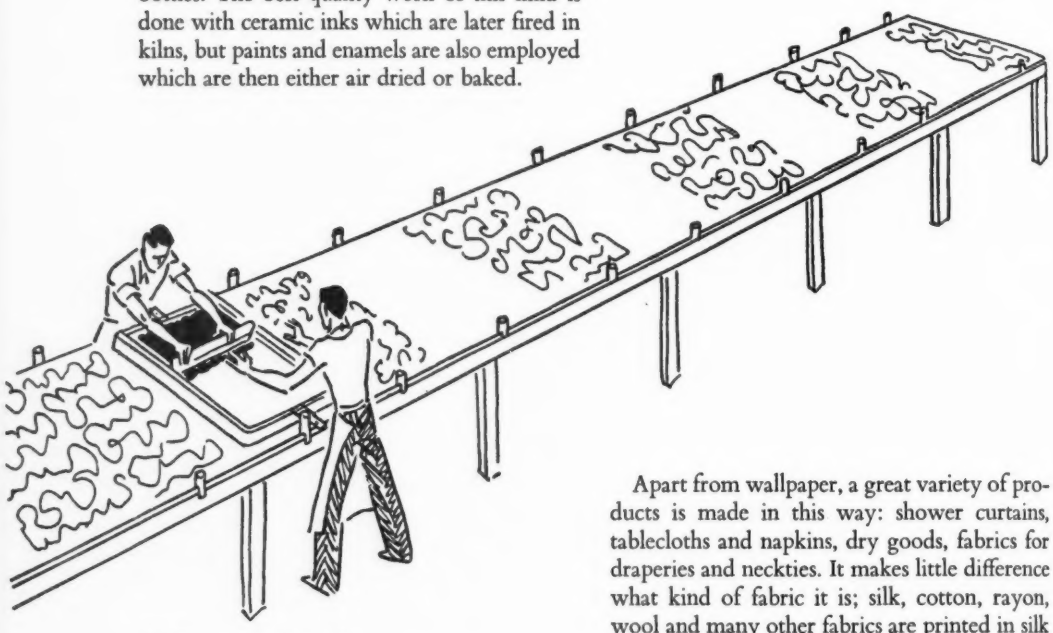
The great versatility and adaptability of the process is amazing. It can also be used to print bottles and other cylindrical objects all around. Even though this is a specialized field in itself, it is interesting enough to mention how the work is done.



In printing on paper, cardboard and all other cut materials, the screen is stationary and the stock is moved. In the printing of wallpaper and bolts of fabric, the material is stationary and the screen is moved. But in both cases, the printing is done by moving the squeegee across the screen. Cylindrical bodies are printed by using a stationary squeegee and a moving screen

which rotates the object—a bottle or lipstick case, for instance—by friction.

Glass factories have installed automatic equipment which feeds, prints and delivers the bottles. The best quality work of this kind is done with ceramic inks which are later fired in kilns, but paints and enamels are also employed which are then either air dried or baked.



Wallpapers and textiles

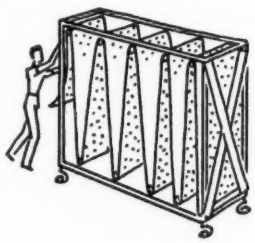
These industries employ the silk screen process very extensively. Wallpaper and textiles have one thing in common for the printer: they are printed in long bolts and the printing equipment is therefore very similar. But the similarity ends here and printing medium and finishing operations vary to a rather considerable extent between fabrics and wallpaper.

Wallpapers and textiles are printed on very long tables, approximately 100 to 300 feet long. Their widths vary between 4 and 6 feet. The material is fastened to the table either by pinning or gluing. Along the two long sides of the table, rails with movable stops are mounted. These serve for registry. Screens are made in various ways, according to the material to be printed. For wallpaper, cut film screens are mainly employed. For textiles, hand-painted or reinforced photographic screens, made for the most part by directly sensitizing the screen, are more commonly used.

Apart from wallpaper, a great variety of products is made in this way: shower curtains, tablecloths and napkins, dry goods, fabrics for draperies and neckties. It makes little difference what kind of fabric it is; silk, cotton, rayon, wool and many other fabrics are printed in silk screen.

The printing team consists of two men. They carry the screen and put it down on the table, squeegee one or several times across and move it to the next stop. If continuous patterns have to be printed, it is customary to skip one repeat, which is filled in after the first print is dry.

Once the fabric is printed, it is festooned for drying and then put through all the necessary finishing operations.

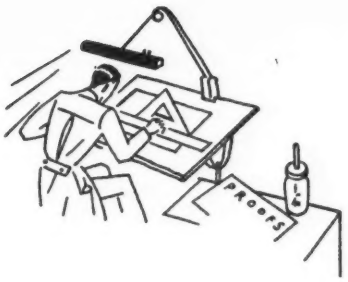


Preparation of art

Silk screen is ideal for bold line, multicolor work, and is fine for dry-brush effects. It can be used for single-color halftones to some advantage.

Art work in full size and full color is best for a silk screen job. Whenever possible, the artist should also prepare a set of color swatches to be sent along to the printer. It is much easier to match colors from swatches than from original art work and, furthermore, original art work can be kept considerably cleaner this way.

It is also very common to make just a pencil drawing and to add a tissue indicating color breakdown. Lettering can be cleaned up in cutting. Whenever cost is of great importance, sans-serif type faces should be selected.



Very often, art work is prepared smaller than finished size. Sometimes illustrations or copy which were used before have to be blown up or reduced and stripped into place. All this can be done by the better silk screen houses; but instructions should be very clear to avoid mistakes. The printer will then make a paste-up in the size of the job, and it is good practice to submit this paste-up to the customer for a final check.

For work in which photographic stencils are used, black and whites should be supplied ready for the camera. Copy should be very sharp and opaque, preferably larger than the finished size of the job.

The most important thing to remember is that the silk screen process is a reproduction method in its own right. It should not be used as a substitute for other printing processes. Silk screen excels in many respects, yet it has its limitations.

Paper and cardboard

The ideal stock for very fine silk screen work is plate-finished paper. Clay-coated stocks work well but should be avoided when printing transparencies. Transparent inks are too much absorbed by the coating and change color. Papers and cover stocks with very strong structure should be employed only on jobs without fine detail. It is, in general, better practice to take a smooth paper and to pebble it afterwards.

Display work is primarily done on cardboard lined with book paper. This eliminates mounting paper to board and affects a considerable saving. On the other hand, it is advisable

to print halftones and very fine detail on paper and to mount afterwards. But this is done only on the most intricate jobs.

Clay-coated board can be used for display work with great success. Its smooth, calendered surface is ideal for printing. But transparencies turn color and do not varnish well. Another disadvantage of clay-coated board is its tendency to chip on the edges in die-cutting.

Otherwise all kinds of Bristols, cover stocks, mill blanks, book papers, flints and foils are used very successfully; also wood, glass, plastics, sheet metal, masonite, tekwood, hardboard, fabrics and oilcloths which are all suitable for the process.

Pricing

Let us remember that all work is done by hand in silk screen. Cuts are made by hand, as well as color separations, and the job is finally hand-printed. The detail of the job influences cost very much.

When pricing a job, the estimator has to take into account, not only the amount of work on the screens, but he also has to consider the matching of color and the speed with which the job can be run. This in turn depends on the kind of stock and the inks employed as well as on the detail of the screens.

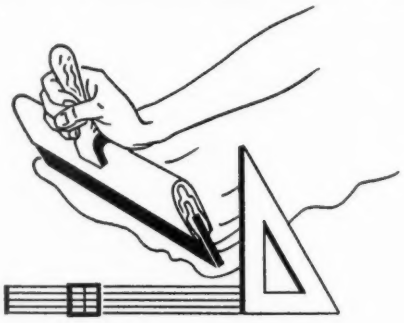
It is therefore obvious that a great deal of experience is necessary before one can estimate jobs properly. It is also understandable that no set scale of prices can be established.

Metal screens

During the war, the dial industry, which uses silk screen very extensively, started to replace silk with metal gauzes. Phosphor bronze, Monel and stainless steel screens were made that permitted much finer prints than silk, particularly in photographic work. Silk screen prints done this way look like the very finest engravings.

It is likely that more and more silk screen printers will make use of metal screens for very fine photographic work. Metal screens have one main disadvantage: they are not resilient and, once nicked, cannot be straightened out again.

Another problem is price. They cost many, many times as much as silk screens and also need special equipment for stretching in larger sizes. On the other hand, photographic film can be removed perfectly and the metal screen reclaimed many times. Another very important advantage of metal screens is that they do not lose their tautness in humid weather. Therefore, it is possible to get much better register.



Some new developments

A new, pre-sensitized film has been put on the market by the Craftint Company, which is used in many shops and saves the time necessary for sensitizing. Other advantages also are claimed.

Directly sensitized screens are made out of polyvinyl alcohol, instead of gelatin, with the advantage that they can be developed in cold water. The government has also published a report (Textile Series—Report #5) about a method of making such screens, developed by I. G. Farben, which is interesting for those who use this type of screen.

Mechanization

During the last 30 years repeated attempts have been made to mechanize silk screen printing. There was hardly a year during this time when the U. S. Patent Office didn't issue several patents for silk screen printing machinery.

Millions of dollars have been spent in experimental work. Several presses have come on the

market; some of them have been used and are used here and there. Until now, however, no generally accepted press exists such as the Harris or Webendorfer or Kelly in other fields of the graphic arts. Most silk screen shops still print by hand.

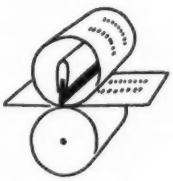
The war stimulated the building and developing of mechanical printing equipment in this country and also in England. Several firms have announced presses and undoubtedly the next 5 years will see greater progress in this respect.

Squeegee pressure

The experienced operator knows just where to apply a little more or a little less pressure, and will do it automatically, and adjust himself to different paints or stocks without long preparation. And there is much more than just that involved in making a silk screen press that will not only produce, but that must produce perfectly and reliably and fast. And it should be easily adjusted for all the various problems with which the average silk screen shop is confronted today.

Various machine principles

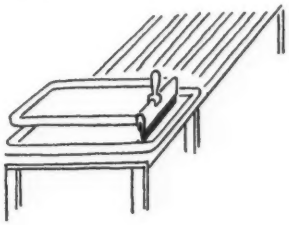
The Rotary Screen: in machines of this type, the screen is attached to a cylinder or drum. In the center of this drum there is a stationary squeegee. The drum rotates, the paper is fed onto a cylinder and brought into contact with the squeegee drum at the point where the squeegee is located.



Machines of the rocker type such as the oldest silk screen press, the Selectasine Machine, and variations of it.

Machines based on the principle described for bottle printing. The squeegee is stationary, a flat screen makes a reciprocating movement and the stock is fed to a drum which rotates.

Machines of the flat-bed type which assimilate closest the methods actually employed in hand printing.



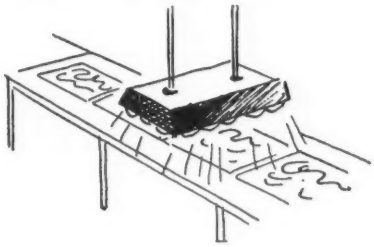
Of the four types mentioned, it is the author's personal opinion that the last is most promising, and he has completed a flat-bed press which has proved successful in operation for quality of printing, fine register and speed.

New drying methods

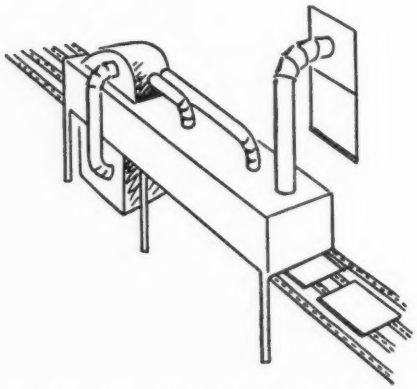
Important as the mechanization of printing is, it still is not a complete solution as long as the prints have to be put in racks for drying.

It is naturally the dream of every silk screen printer to have equipment like that so common in the other fields of the graphic arts: a machine that will feed, print, dry and stack the prints.

Efforts have been made to speed drying. The



two main avenues of approach have so far been drying by infra-red bulbs and by convected heat and air. Both of these methods of attack hold a certain amount of promise for multi-color register work and produce good results on less intricate work.



But drying should not be attacked from this side only. It has to be tackled from the ink and paint angle, too. The customary silk screen paint ("oil paint") cannot be dried satisfactorily fast enough with either infra-red or convected heat; complete drying takes a long time.

Ink manufacturers have started to work on the problem and have produced paints that dry by evaporation of the solvents only. This type of material can be truly dried in a very short time, but these types of paint are not nearly as opaque as the oil paints and can therefore be of only limited use. It can be assumed that the problem of drying will be attacked with much more vigor by both ink manufacturers and manufacturers of drying equipment once mechanical printing equipment becomes customary.

Knowledge of the methods of production, their advantages and limitations, will enable production men and artists to plan their jobs better and more economically. They will be in a better position to foretell what results can be obtained and what cannot be done, thereby achieving more efficiency all around.

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Three Dimensional Wood Engravings

The Work of Misch Kohn

by PETER SELZ

SHARPLY aware of the restlessness, anxiety, and bewilderment of modern man, Misch Kohn expresses his concern as a powerful formal statement. His work is preoccupied with the conflict between society and contemporary men—men distraught and terrified before the constant threat of death. Violent tensions pervade his prints; even when rhythmically rounded his line is knife-like and piercing.

Kohn has brought his medium, the wood engraving, to a state of highest development. With a general concept of the finished work in mind, he begins his design in rhythmic linear constructions. The final form evolves through a long, deliberate process of about eight to ten drawings, varying from print to print. The first free-flowing lines appear as heavy blacks on the print. These are echoed in gray tones flowing alongside them and are then accented by areas of brilliant white. Finally the design is bound and strengthened with black counter-structural lines.

Using the traditional burin of the wood engraver, he follows the convention of the technique and cuts away those parts of the block which will not be printed. He works in very close-grained, hard boxwood, and his blocks are extremely large. The prints, up to 20 by 30 inches, are probably the largest ever done by a wood engraver.

He pulls these prints under great pressure, about 3000 pounds per square inch, on a litho-press, rather than on the usual letter-press, and his fine China paper and blotters are kept very damp during the printing process. This dampness and the extraordinary pressure of the pulling create the embossed whiteness, the effect of brittle, three-dimensional whites contrasting to the deep blacks. He engraves on wood rather than on metal in order to obtain these brilliant whites and intense blacks, as well as his extremely subtle gradations of gray and his widely varied texture effects.

Kohn's audience, however, is little conscious of his wood block. Much like nineteenth century wood engravers, such as Bewick and Daumier, he emphasizes the black line and uses white for a foil. This is a highly interesting reversal of the "modern" trend in the woodcut and wood-engraving, which ever since Vallotton, Munch, and the German Expressionists has accentuated white areas against a black background, stressing the inked surface of the block.

Textures, very important in all his work, are most pronounced in his earlier engravings, like *Tiger* and *Bull Fight*. In the latter crimped, crinkled lines extend from the bull's head over the entire body. Beginning as an almost realistic representation of the animal's hair, they develop into an intricate, variegated pattern. The powerful bull plunging forward is a visual equivalent in black and white of the sensation of a mighty, moving mass. Black areas of the bull's back continue perceptibly into the implied background, integrating the animal in the large environment, and the small horseman set above the main scene develops the impression of three-dimensional space.

While *Bull Fight* is ornate in its brocade effect of textures, *Trio* done later in 1949, lacks most embellishments. The first is a memory picture of Kohn's visual experience in Mexico and evokes the ceremonial feeling of the spectacle.

TIGER *24½ x 16½ inches* MISCH KOHN 1949

TRIO *16 x23½ inches* MISCH KOHN 1950

SLEEPING SOLDIER *24 x 18 inches* MISCH KOHN 1951

But there is little ceremony about a jazz trio playing through the small hours of the morning in a low-down dive. Here space has been flattened out to the two dimensions of the picture surface. The three heads of the musicians merge together and this frieze of heads is continued in the top of the bass viol bringing the rhythmic staccato movement down to a large saxophone where the eye comes to a temporary rest, only to be pushed up again to the triple face. Straight black diagonals with their strong structural effect reinforce the total form like a trellis, closing and containing the composition, but the rhythm is always the brittle rhythm of syncopation.

The embossed whites are extremely important in Kohn's total form. They frequently call attention to the limit of a form or accent a curvilinear rhythm. They do not give the illusion of a third dimension—they actually are a third dimension. They have the effect of paint applied with a palette knife, and the white of the paper itself takes on an added significance.

Bull Fight, like Hemingway's *Death in the Afternoon*, indicates a preoccupation with the problem of death which continues through Kohn's work. It is implied in the staring, melancholy eyes of the *Trio* and becomes a frank statment of theme in *Death Rides a Dark Horse*. The eyes of the elegantly shaped horse are glaring and fearful as he climbs through space with a headless horseman on his back. Kohn's technique is extremely provocative here; at one instant the rider seems to be sitting on the horse and at the next to be interwoven with the background.

This tension of space is a highly important element in his work. In the *Sleeping Soldier* (1951) things again can be seen in many different ways. Is the figure surrounded by mountains or battlements, by ships or by flags waving in the wind? The observer is free to make his own associations. But the artist unmistakably enmeshes the soldier in a net from which there is no escape.

The sleeping soldier is a dead soldier. His agonized figure becomes a part of the continuous flowing movement. His lines continue in the lines of the stream and the background of sea and sky. There flowing lyric lines and embellished textures counteract and restrain the original conception of brutality in the harrowed face and tortured hands, reminiscent of Grünewald's crucified Christ. Here, in Kohn's *Soldier*, intense emotion has become eminently poetic.

The basic content of his work, the anxiety of modern man as he confronts seemingly inescapable death, is more clearly expressed in each succeeding major work. This may be due as much to the increased acuteness of a world situation of which he is fully aware as to his own development; it reaches further expression in *Head of a Contemporary*.

This engraving communicates immediately on a visual level. Now the illustrative element is totally abandoned. Form is simplified to geometric shapes. There is a series of triangles emerging from a central point: the white of the nose, the black triangle below it, the horribly gaping mouth. The eyes are black holes penetrated by white pupils, emphasizing depth. The contrast between negative and positive shapes which was important in his earlier work is now completely mastered. While the spectator has been before greatly interested in the technique of patterns and textures and in craftsmanship, he is now intensely conscious of a total experience of humanity in anguish. But perhaps the "Contemporary" is moving out of a dark pit into hope—as the mouth pushes into the light, almost white, area on the left.

Kohn's symbol of violently suffering man recalls the artists whom he himself considers as his archetypes: Grünewald, Bosch and Pieter Breughel the Elder; but his visual idiom, his use of distortion, is very much a part of the semi-abstract expressionism of some of the best contemporary American and European artists and shows the inescapable impact of such men as Orozco and Picasso.

Kohn's most recent and most monumental wood engraving, *A Season in Hell*, was inspired

BULL FIGHT
23¼ x 15⅜ inches
MISCH KOHN
1949

FISHERMAN
15⅞ x 24 inches
MISCH KOHN
1950

HEAD OF A CONTEMPORARY
13⅞ x 21 inches
MISCH KOHN
1951

SEASON IN HELL
19 x 28⅝ inches
MISCH KOHN
1951

by Rimbaud's poem. It is a visualization of man struggling with himself. Like the *Sleeping Soldier,* who is bound in a web, so this figure attempts to free himself from the large egg-form which surrounds him.

The whole movement is that of a wheel. We see the head and then the large black hand grasping out into void space; we look down to the lower hand which also struggles out of confinement into emptiness; finally a foot without foothold and the eye shifts up again to the heads. These are all-impotrant, symbolizing mental and emotional, rather than physical torture.

This man is engaged in a fierce attempt to break out of his prison, but there is little hope waiting for him in the totally black abyss. Everything seems to express frustration: the left stippled oval outline wants to move back to the mother egg-shape to which it is hinged. But its own shape is already different; it no longer fits and cannot return.

The print resembles a sculptured relief. This is not only because of the embossed white areas which have here been used with great economy and effectiveness, but largely because of the large, simple black sections and their contrast to the textural complexity of smaller areas. A sense of uncanny and infinite depth is achieved by the whites which, far within the picture space, light up the background.

On closer observation one sees constant variations on basic primary forms: triangles, crescents, circles and elipses, and notes the very fine and sensitive visual and tactile treatment of the egg-rock in the background with its mosses, lichens and geological strata.

The engraving is a bitter but powerful statement of man's affirmation of himself through an utterly lonely struggle for existence.

BORN in Kokomo, Indiana, in the heart of America's fertile farmland and cultural wasteland, Misch Kohn began his studies at the academic John Herron Art Institute in Indianapolis where his rigorous training in drawing became significant for his later development. He went on to the Federal Artist's Project in Chicago during the 1930's. This brief period of government-subsidized art in America made it possible for Kohn, as for other American artists, to devote his full energy to painting. His association with the Mexican graphic artists during 1943–44, when he worked with Mendez, Zalce and others in the *Taller de Graphica Popular* and was close to Orozco was also vitally important to his work.

In addition to his achievements in the field of purely creative art, Kohn has gained a very substantial reputation as a commercial designer, and he is now in charge of the visual design department at Chicago's Institute of Design.

He devotes his efforts as a teacher to stimulating experimentation among the techniques of the graphic media, for his frankly-avowed goal is to lead the student as directly as possible toward the discovery of the particular form most adequate for his particular statement.

Kohn has exhibited in most American museums, as well as in Europe, and his work is already to be found in many private and public collections, including the Museum of Modern Art in New York, the Brooklyn Museum, the Philadelphia Museum, the Art Institute of Chicago, the New York Public Library, the Library of Congress, and the Bibliotheque Nationale and the Musee d'Art Moderne in Paris.

BOOK REVIEWS *by* M. J. GLADSTONE

CARL DAIR, whose *Design with Type* has been published recently by Pellegrini and Cudahy, is the art director of Design Workshop, Ltd., of Toronto and has been the typographical director of the Canadian National Film Board and lecturer on typography at the Montreal Museum of Fine Arts and L'Ecole des Beaux-Arts in the same city. Since news of typographical matters comes seldom enough from north of the border, these accomplishments have a certain geographic interest—as, for that matter, does Mr. Dair's book. "As a working type compositor, layout man and designer for over twenty years," a cover blurb tells us of the author, "his own experience has led him to recognize the need for a practical analysis of the principles underlying good typographic design." Elsewhere on the cover, we learn that this is "the first book to discuss typographic design in a contemporary sense, applying the Bauhaus principles to the problem of commercial printing in a completely practical, workmanlike way," and that it is addressed primarily to the printer. It is a matter of some surprise that such a volume comes from a Canadian pen, but, perhaps erroneously, I am revising my former (ungrounded) thoughts on what goes on in at least Toronto and Montreal.

It would appear that Mr. Dair is responsible for the format as well as the writing and illustrating of his book, and the format is decidedly unusual. *Design with Type* is what is sometimes called a horizontal volume, although in this case the term *super-horizontal* would be more appropriate. It is spiral-bound in a heavy cover paper which exceeds the page measurements by about one-fourth of an inch in both length and breadth. Since the fine metal spiral describes a fairly wide circle and the paper punchings are extra-large, both pages and cover have considerably more directional latitude than is usual, and reading the book is apt to be a messy and trying affair.

Within, the type pages are not centered on the spiral—both left and right ones holding to a very narrow right margin (3 picas) and an expansive left (11 picas). The top margin is fixed at five picas and the bottom at three picas. Folios are flush right when the layout permits —otherwise, they are flush right on the left column of the two-column page.

I describe these matters in some detail because they seem to be in conflict with a portion of the text, and because in this conflict is to be found the fault of an otherwise admirable thesis. "Why," Mr. Dair asks at one point, "should we depart from . . . practice . . . established through centuries of fine printing?" In answering his question he makes the usual separation between the book and the advertisement. "The quiet typography of books, designed to give a man comfortable reading in the leisure hours in his home," he writes, "is not adequate for selling wares in the visual hubbub of the marketplace." Beyond this, he indicates that his concern is not with book design, anyway, but with areas where "diverse elements" may be organized into "a compelling, attractive visual unit." While no specific attempt is made to reconcile the "quiet typography . . . designed to give a man comfortable reading" with the "compelling, attractive visual unit," we have the present volume as evidence that the book is not to be excluded altogether from the latter province.

It is, in fact, apparent that the format ot *Design with Type* was not planned on a comfort-leisure-home basis, at all. The reader will learn eventually that it embodies some of the principles Mr. Dair has developed primarily in connection with advertising, and on the whole that purpose will justify its oddity. Besides, there is a crispness about the layout and a logic which cannot be denied. The long low page with its wide left margin is a flexible area for displaying the many persuasive illustrations (although occasionally the text and its mated

diagrams are separated through what seems to be carelessness), and there is a nicety of relationship between type blocks and white space that speaks for a sensitive designer's eye. Finally, outside of an initial shock, the reader will probably find that his ordinary reading mechanics are quite suitable for dealing with Mr. Dair's design—especially if he does not share my own prejudice in favor of paragraph indention. But admitting all these considerations, the fact remains that this book does not really conform to the book the author has set up as an ideal; and the circumstances of its nonconformity lead to an examination of the direction in which he leads us.

For the sake of clarity, I had better point out here that Mr. Dair uses the word *elements* to mean "forms, or aggregations of forms, which cohere in a visual unit"; that he uses the word *relationship* to deal with the interaction of elements; and the word *principle* to apply to fundamental laws of relationship. The elements of typography are, therefore, the individual character, the combination of characters (the word), the combination of words (the type line), and the combinations of lines (the mass). Mr. Dair scrutinizes all of these with alert thoroughness; and in the case of the type line, which he handles in terms of texture, he brings some particularly fresh observations to his subject. He does not write well, but he does write simply—as if he were enlarging on a neatly planned outline—and he defines most of the terms which might possibly suggest private thought. I find his list of elements too exclusive (I would prefer to have seen some of his *relationships* handled as elements) but it is simple to grant that they underly all typography.

Relationships are a different matter, for it is under this heading that the sheep are separated from the goats; the book is dropped from discussion so that forces which determine typographic design may be identified as "the desire to achieve strong visual impact and the need to organize our elements into a unified whole." Both of these forces, Mr. Dair writes, rest on

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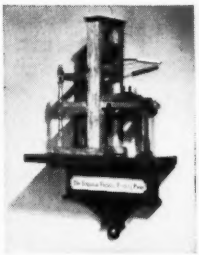
"relationships between elements of the composition," and he treats such relationships according to the kind of elements used, how they are put together, and where they are put together. He calls them "relationships of harmony and contrast," "relationships of structure," and "relationships in space."

There are several divisions made here which seem faulty to me, and some of them had better be put down to semantic malocclusion. But subsequent treatment of harmony and contrast bears out my initial difference. Mr. Dair mistakes harmony for similarity and contrast for opposition. He uses the term *conflict* to define "a variation not strong enough to give contrast," and contrast, he tells us, is essential to good advertising design. This division is especially faulty because it is responsible for important omissions in later chapters. Harmony should have been Mr. Dair's key word, and contrast should have been discussed under it. If that had been the case, *Design with Type* would have considered the possibility of harmony in progressively violent contrasting relationships —the crux of design. As it is, we must be content to learn that contrast may exist in the realms of size, weight, letter structure, form, color, texture, and direction, and that these contrasts may be combined in different ratios on different printed pages. The harmony arising out of such combinations would appear to depend on the designer's instinctive taste.

This amounts primarily to faulty planning on Mr. Dair's part, and I think that better planning would have produced a more useful book. If there are to be fundamental principles which form the foundation of type design, they will obviously apply to all type design—to the book as well as to the advertising piece. Words like compelling, persuasive, and dynamic describe secondary considerations. The primary consideration is inevitably the harmonious relationship of the elements involved.

Actually, Mr. Dair arrives at principles which should govern book design until he deals with structure, and here he prematurely directs our

A Perfect Holiday Gift



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attention to dynamic or compelling structure. Symmetry, he tells us, is static and, therefore, of no importance to the advertising designer; and this perpetuation of a grade school myth which provides for two opposed types of arrangement does him a disservice. What basic principles determine structure must account for all types of structural relationships. The fact that assymmetrical arrangements are more compelling to the modern eye is a secondary matter. Rules like "Marginal relationships should be unequal" or "Directional movements should tend to contact the edge of the sheet," are not at the root of structure, nor are they *fundamental* laws of relationship. Such fundamental structural laws—dealing with the proximity of units, continuation of form, similarity of units, closure of isolated units, and rhythm—Mr. Dair handles under space. And again, this seems to me to be faulty planning.

Despite these faults, *Design with Type* is, as its publishers claim, "the first book to discuss typographic design in a contemporary sense" (let's just forget about the Bauhaus). It is solid reading based on serious consideration and experiment with the problems it raises; and those problems are, as Mr. Dair claims, at the root of designing. (At least for the most part; I can't agree that the consideration of a third dimension is important to the printed page.) Finally, it brings a generally satisfactory critical terminology to the graphic arts, and that is a very great achievement.

DESIGN WITH TYPE. By Carl Dair. Pellegrini & Cudahy, New York, 1952. 8⅝ x 5½ inches, 144 pp. including 14 pp. of specimen layouts. $4.50.

A NEW edition of a book which was out of print six months after its initial (private) publication in 1942. This time, however, the illustrations are reproductions of decorated book papers instead of the actual pieces so generously included ten years ago. Philip Hofer, the editor of the present edition, has included three short

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essays on the late Mrs. Loring by Walter Whitehill, Dard Hunter, and Veronica Ruzicka. A photolithographic reproduction of one of Miss Ruzicka's attractive paste papers has been used for jacket and end papers.

DECORATED BOOK PAPERS. By Rosamond B. Loring. Harvard University Press, Cambridge, 1952. 5½ x 8¼ inches, xxxii + 171 pp. + 16 full-page plates. $3.75.

AN introduction to a subject hitherto by-passed by scholars and curators, and a very rewarding study. Engraved watch papers were once used as packing between the inner and outer case of the watch to keep the case firmly closed and to protect the works from dust. Their history in America dates back to 1758, and, since some of them are signed, Mrs. Spear has been able to identify twenty-four engravers working in this country by the first quarter of the nineteenth century.

AMERICAN WATCH PAPERS. With a descriptive list of the collection in the American Antiquarian Society. By Dorothea E. Spear. Published by the Society, Worcester, Mass., 1952. 6½ x 9¾ inches, 76 pp., ill.

MR. JUDD has put in twenty years at the National Bureau of Standards in the Photometry and Colorimetry Section, and these have unfortunately predisposed him in favor of the government bulletin technique of presentation. He writes of his book that it is "an attempt to present visual psychophysics in terms that are practically useful." This is very difficult and highly technical sledding.

A short section is devoted to problems arising out of the reproduction of pictures in color.

COLOR IN BUSINESS, SCIENCE, AND INDUSTRY. By Deane B. Judd. John Wiley & Sons, Inc., New York, 1952. 5⅞ x 9¼ inches, x + 401 pp. $4.50.

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BEFORE embarking on this study, Mr. Seaton was engaged in outlining the origins and developments of the constitutional guaranties of freedom of speech and of the press in the American Bill of Rights. This led inevitably to the investigation of English origins or our own concepts—a field of study in which, remarkably enough, there is a very scanty literature. (The literature is even more scanty, Mr. Seaton tells us, in the history of English printing and journalism.) The present volume is somewhat dry and academic; conclusions and theories of change are rigorously confined to the introduction, which leaves only neatly-sorted factual data to the main body of text. But these data are of considerable interest in themselves, and perhaps it is for another to write the more sweeping history of the freedom for which Mr. Seaton has provided an admirable groundwork.

FREEDOM OF THE PRESS IN ENGLAND, 1476–1776. By Frederick Seaton Siebert. The University of Illinois Press, Urbana, 1952. 6 x 9¼ inches, xiv + 411 pp. $7.50.

A SERIES of lectures (Bampton Lectures in America, Number 4) delivered at Columbia University in 1951. Mr. Mumford's thesis, that "the tool, once so responsive to man's will, has turned into an automaton; and at the present moment, the development of automatic organizations threatens to turn man himself into a more passive tool" is a sound one. He traces the development of the current state of affairs and pleads for the recognition of personal initiative with highly persuasive clarity; and the reader is reminded that the American dean of architectural criticism is also a philosopher of no mean standing. In dealing with the transition from handicraft to machine art, Mr. Mumford illustrates the breakdown of a unified process of work with the invention of printing from movable types; and makes some significant comments on modern typography.

ART AND TECHNICS. By Lewis Mumford. Columbia University Press, New York, 1952. 5¼ x 8¼ inches, 162 pp. $2.50.

THE THIRD appearance of both of these studies, now reproduced in offset from the second printing. Goudy wrote with an understandable pride in his own accomplishments. In connection with the design of Forum, for instance, he is immodest enough to quote Bruce Rogers' statement that they are the first types ever cast "distinguished by their successful rendering of classic feeling . . . . The capitals known as Forum are the most beautiful, and have been widely used & imitated." Nevertheless, he is remarkably humble in the face of his craft. These statements on the history of letter forms and their making are marked by a simplicity and a humility that must have been born of his many years at the drawing board and his prodigious production.

THE ALPHABET, AND ELEMENTS OF LETTERING. By Frederic W. Goudy. University of California, Berkeley, 1952. 9 x 12⅝ inches, (xiv) 411 pp. $7.50.

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TOP DRAWER

The third annual MAGAZINE SHOW sponsored by the American Institute of Graphic Arts (new home 13 East 67th Street, New York) proved a time-consuming but inspiring task for the jury according to Mr. F. E. Church of Time, Inc.

The other jurors were Dr. M. F. Agha, Jess Garkin, Richard Ellis, Daniel D. Mich and James Boudreau. This competent panel saw real cause for encouragement in the fact that of the 563 publications submitted, there were scarcely any examples of inferior production. An increasing awareness was apparent among all production people of the necessity for cooperative efforts to meet printing requirements.

149 "representative" magazines were selected on the basis of six qualifications: layout and design; illustration and photography; typography and lettering; editorial visual presentation; cover design; printing craftsmanship.

House Beautiful, circulation 600,000 monthly, published by Hearst, printed by Cuneo, topped the list with six mentions for commendable excellence. 25 magazines, such as *Fortune, Town & Country, McCall's, Esquire, Mademoiselle,* rated higher than yours truly *PRINT*. We have taken our small staff to task about this situation and will exert every effort to make a better showing for our readers in 1953.

* * *

An informal poll of the packaging industy has indicated many drawbacks to the term ANILINE printing. A "New Name Task Force" was appointed to report to the 14th annual forum of the Packaging Institute. Three suggestions were presented: Flexographic Process, Permatone Process, or Rotopake Process. FLEXOGRAPHIC was chosen as the new official description.

* * *

At a "What's New in Design" session of the AIGA Printing for Commerce Clinic, Dr. Robert L. Leslie as moderator introduced four distinguished designers as guest speakers.

Dr. M. F. Agha commented that while there is little "really new" in design today, current American designers are doing an excellent job and have the ability to adapt themselves to changing conditions and requirements.

George Krikorian noted a new "honesty" in designers' approach to their work—a closer alliance and understanding between the designer and what the advertiser wants to say—a lessening of the designer's urge to "prove and demonstrate" his own particular abilities and contributions to the graphic arts.

Xanti Schowinsky discussed the over-all function of design which to be successful must combine all aspects at once—functional, technical and artistic. The "ideal" situation would be for "fine arts" and graphic design to be drawn together until there would be practically no difference between them."

Leo Lionni differed with Dr. Agha in expressing his opinion that new things in design are developing continually. He observes a present trend away from the "pseudo scientific" toward a more human, realistic approach, an example being the increase of "raw photographs" in advertising. He also sees the designer "as more and more becoming less and less specialized and spreading his interests into many fields of both industrial and graphic design."

Leo Joachim, Clinic Chairman, called particular attention to Dr. Leslie's long and brilliant record of service in the interests of fine graphic design and printing, including such tangible evidences as the magazine *PM* (later *AD*), and his work of the graphic arts education center of New York University. Dr. Leslie has introduced and reviewed the work of hundreds of designers, illustrators and printers in the AD Gallery which he has fostered with Composing Room, Inc. in New York.

* * *

2nd Lt. Joseph C. Rodriguez
U.S. Army
Medal of Honor

SIXTY YARDS TO GO. From atop the hill, near Munye-ri, Korea, the enemy suddenly opened up a withering barrage. The squad was caught; Red mortars began zero-ing for the kill. Lieutenant Rodriguez (then Pfc., with only seven months service) broke loose and dashed up the fire-swept slope, throwing grenades. Disregarding the fire concentrated on him, he wiped out three foxholes and two gun emplacements. Alone, he accounted for 15 enemy dead, led the rout of the enemy, and saved the lives of his squad.

"When you have to take chances to reach an objective, that's O.K.," says Lieutenant Rodriguez. "But when you can find a surer way, so much the better. That's why I was glad when I heard that people like you own *nearly 50 billion dollars* in U. S. Defense Bonds. I believe that a strong, *peaceful* America is our objective. And the *sure* way to reach it is through backing *our* strength with *your* strength by investing in United States Defense Bonds *now!*"

★ ★ ★

Now E Bonds earn more! 1) All Series E Bonds bought after May 1, 1952 average 3% interest, compounded semiannually! Interest now starts after 6 months and is higher in the early years. 2) *All maturing E Bonds* automatically go on earning *after maturity*—and at the new higher interest! Today, start investing in better-paying Series E Bonds through the Payroll Savings Plan!

Peace is for the strong! For peace and prosperity save with U.S. Defense Bonds!

The U.S. Government does not pay for this advertisement. It is donated by this publication in cooperation with the Advertising Council and the Magazine Publishers of America.

"There are no foreign languages in painting as there are in speech: there are only local dialects which can be understood internationally, for painting is a kind of visual Esperanto."

This statement by Alfred H. Barr, Jr., is the credo for a non-profit organization IGAS, "The International Graphic Arts Society, Inc."

Original prints of graphic art engraved on metal, carved in wood, drawn on stone or painted on silk—are, of course, multiple. Consequently, signed originals can be owned by many people and each print obviously costs far less than would a single painting or watercolor. The aim of the society is to encourage art and to implement international tolerance through the arts by distributing work by outstanding American and European graphic artists to its members in the United States and, conversely, by distributing the work of American artists to members of similar non-profit societies in European countries.

Information about society activities, membership and privileges may be addressed to IGAS, 141 West 54th Street, New York 19.

* * *

A 3-cent GUTENBERG STAMP has been issued to commemorate the 500th anniversary of the printing of the first book, The Holy Bible, from movable type, by Johann Gutenberg. The issue coincided with the national observance of Bible Week.

The stamp is 0.84 by 1.44 inches, horizontal, and printed on rotary presses, electric-eye perforated in sheets of 50. The color is the usual ghastly 3¢ purple. A rich black for a change would have brought out the details of the rather fine engraving.

The mural painting by Edward Lansing used for the central subject of this stamp now hangs in the New York Public Library.

* * *

A VOICE TYPEWRITER which will write out automatically what is spoken into it has been predicted by a Japanese electronics expert.

Dr. Hideo Seki is said to have worked out the theories for the construction of the voice typewriter. Two months of research at the Massachusetts Institute of Technology convinced him it will work.

* * *

A special red and blue POSTAGE STAMP honoring the International Red Cross will be the first to be produced on a multi-color rotary press at the Bureau of Engraving and Printing. The press has been developed and perfected over a period of many months.

* * *

Dr. A. S. W. Rosenbach, the noted BIBLIOGRAPHER, left his personal collection of rare books and manuscripts and the bulk of his estate to the Rosenbach Foundation, a charitable organization with "very general purposes."

Dr. Rosenbach once estimated that during his half-century of buying and selling books his purchases had totalled $75,000,000.

* * *

BAUER TOPIC has recently been made available in Medium and Bold in sizes 8 through 48 point. The creator is Paul Renner who acquired world fame with his Futura.

The rounded forms in Futura were based upon a circle, whereas the curves in Bauer Topic are derived from a rectangle with rounded corners. This produces a closed word formation, giving the printed line a ribbon-like effect that carries the eye across the page.

A light weight and italics in the three weights will also be available shortly.

* * *

BAUER Alphabets, Inc. has issued a handsome and handy condensed catalog, printed in Germany, featuring all the original imported Bauer type faces and ornamental material now again carried in stock for prompt shipment. Address inquiries to 235 East 45th Street, New York 17 or your local representative.

ABOUT CONTRIBUTORS

RICHARD SHERMAN comes from Philadelphia where he attended the Pennsylvania Academy of Fine Arts and the Philadelphia Museum School of Art, where he had an extensive program covering all phases of commercial art, photography and diversified art production courses. He has created for display firms, printers and photographers. At present he lives in Rochester, New York, and is Art Production Manager for the Great Lakes Press Corporation, where his work makes use of his combined knowledge of photography and art.

STEWART HOAGLAND is a graduate of Dartmouth College, class of 1928, where he was editor-in-chief of the daily paper. After graduation he was manager of a family printing enterprise in Somerville, New Jersey, which published a weekly newspaper until the paper was merged with two other local weeklies, Mr. Hoagland becoming secretary of the new corporation. He continued as manager of the C. P. Hoagland Company, commercial and book printers. He joined the Inter-chemical Corporation in Bound Brook, New Jersey, in 1941 in an advertising and editorial capacity, and assumed editorial duties with the Printing Ink Division in 1946.

D. E. TUTTLE attended Pratt Institute, and since 1933 most of his business activities have been in direct connection with aniline printing and the inks used with this process. He joined the Printing Ink Division of Interchemical Corporation fourteen years ago as an aniline service man and is now the manager of Aniline Department in the East. He has lectured extensively on aniline printing before graphic arts groups.

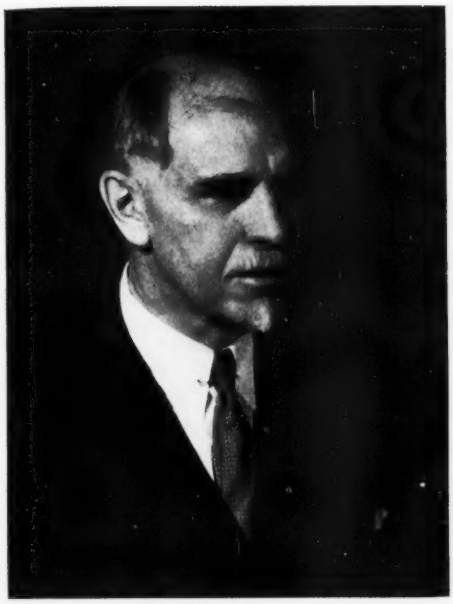
JOHN B. HARTNETT has been with the Haloid Corporation about fifteen years, was previously five years with a Rochester advertising agency and is a graduate of Cornell. He is a director of the Advertising Council of Rochester.

NICK MAMULA is a twenty year veteran in publicity work, now Assistant Director of Public Relations for Campbell-Ewald Company's New York office. A graduate of Ohio State University, his earlier experience includes many years in the motion picture industry with Paramount, David O. Selznick and United Artists. Mr. Mamula presently handles publicity for the American Bicycle Industry, Chevrolet, as well as Rheem Manufacturing Company.

VICTOR STRAUSS produced the cover of PRINT VII:4 in red and black enamel silk screened on real wood veneer, and the frontispiece painting by Andr´ Girard which was silk screened in nine colors. For a note about Mr. Strauss and the two demonstrations of the silk screen process, we refer you to the above mentioned issue. EDITH STRAUSS (Mrs. Victor Strauss) is an artist, designer and silk screen craftsman who works closely with Mr. Strauss at the Pied Piper Press in New York.

PETER SELZ was born in Munich, Germany, in 1919 and received his M.A. degree in art history at the University of Chicago in 1949. His primary interest is in the art of the 20th century. He is currently working on a doctor's dissertation and book on German Expressionist painting. In 1949–50 Mr. Selz was in Paris on a Fulbright grant, conducting research on contemporary French painting. He has taught at the University of Illinois and has been teaching at the Institute of Design of Illinois Institute of Technology since 1949. He is now assistant professor of art history there and head of the Institute of Design's graduate program in art education. Mr. Selz has written *How to Look at a Picture*, published by the University of Chicago, and has contributed many articles, book reviews and translations to *Twice a Year*, the *College Art Journal*, the *Art Digest* and *Arts and Architecture*.

Two distinguished members added to PRINT editorial staff.



EARNEST ELMO CALKINS is often called the "Dean of Advertising", because he is one of the originators of agency advertising as it is known today. The affliction of almost life-long partial or total deafness probably saved him from ulcers and other consequences of high pressure, and also helped him to develop broad interests in graphic arts, literature, and hobbies of many kinds.

Mr. Calkins has been closely associated with some of the most revered names in the printing and publishing fields. He has written several books and numerous other pieces, including more than thirty articles for *Harper's Magazine*.

Mr. Calkins has twice served on the American Institute of Graphic Arts jury in the Printing for Commerce exhibition; he has received the Honorary Degree of Doctor of Letters from his alma mater, Knox College, as well as an Honorary Trusteeship; in 1950 he was awarded the AIGA Medal, and in 1952 a special citation from the Art Directors Club, of which he was a founder.

RONALD G. MACDONALD for many years has been Secretary-Treasurer of the Technical Association of the Pulp and Paper Industry. Born in the paper making town of Berlin in 1899, he graduated from M.I.T. with a B.S. in Chemical Engineering in 1922.

For about two years Mr. Macdonald was on the operating staff of the Pejepscot Paper Co. In 1924 he joined the research staff of the Oxford Paper Co. (Rumford, Me.) in Brooklyn. Two years later he became Market and Research Editor of McGraw Hill's publication, *Chemical and Metallurgical Engineering*.

In 1927 Macdonald was appointed to his present position with TAPPI, and simultaneously acted as the Technical Editor of the *Paper Trade Journal*. In the 30s he helped organize the Inter-Society Color Council, and was Secretary of that group. This year Mr. Macdonald received the Honorary Degree of Doctor of Science from Western Michigan College. In addition to his present duties, Mr. Macdonald is also Editor of TAPPI, official monthly publication of the Technical Association.

PRODUCTION NOTES

Design and Production: W. E. Rudge

Type: Text mostly set in Monotype Bembo because Janson which we preferred to use for better weight on coated paper was booked up. Sans serif heads are Kabel Bold Italic

Processes: Offset cover printed by the Great Lakes Press, Rochester, New York. Aniline tip-ins printed on paper and cellophane by the manufacturer noted on each and supplied through courtesy of the Interchemical Corporation. Xerograph tip-in furnished by the Haloid Company, Rochester, New York. Balance of the issue printed by letterpress at The Lane Press, Burlington, Vermont

Illustrations: The frontispiece "skull" was reproduced from a color photograph by Lester Kahn of New York. It was not made from the oil painting that dominates Tom Noble's office. The painting too was made from the color photograph just to show how successsfully things can be done backwards. The photograph of Misch Kohn is by Harry Callahan.

Engravings: Halftone and line cuts by the Mohawk Engraving Company, Greenfield, Massachusetts, except four copper-line cuts appearing two to a page in the Misch Kohn article, which were made by the P & B Engraving Company, Springfield, Massachusetts, from the poster size original woodcuts.

Paper: Cover, 65# White Offset (anonymous); antique text, Mohawk Superfine Text; coated book, Mead's Richfold Enamel.

Binding: Side wire and cover glued by The Lane Press.

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20 MEMBERS OF STA

will contribute the editorial content and design for the December issue of

PRINT

to commemorate the twenty-fifth anniversary of the Chicago

SOCIETY OF TYPOGRAPHIC ARTS

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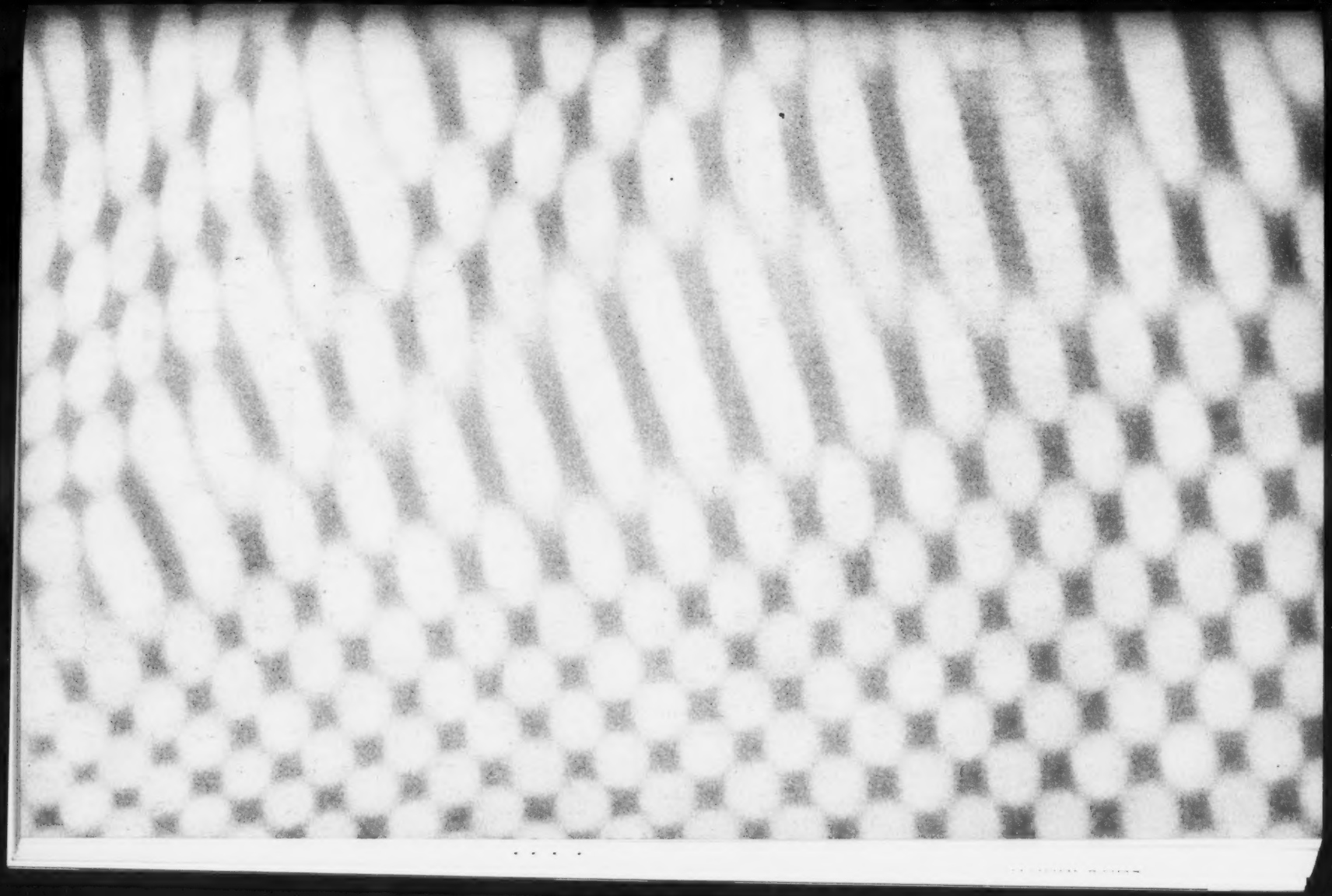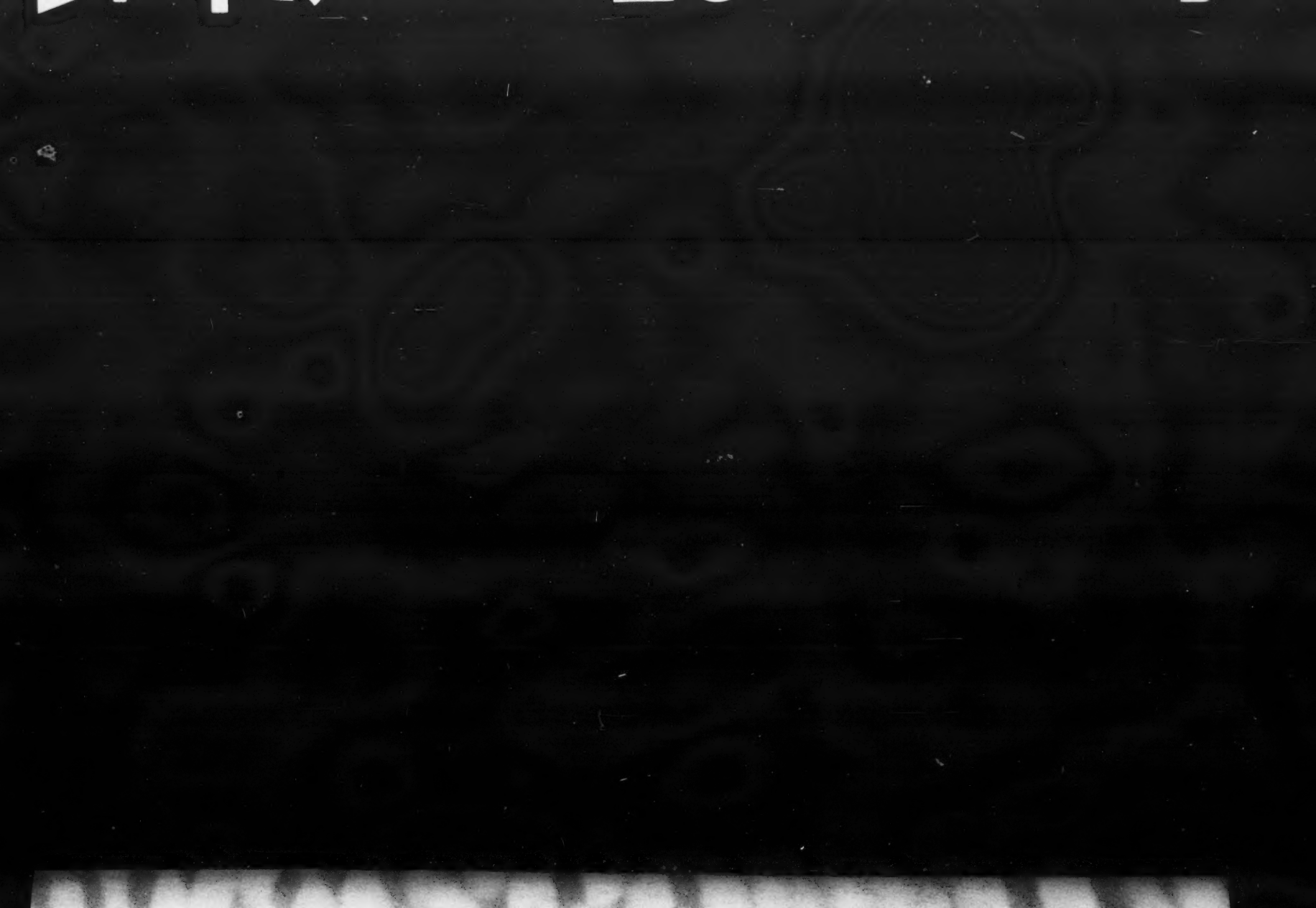
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